RUBBER WORLD

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OCTOBER, 1959

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Economics of Flexible Foams—A Second Look
By Peter B. Baker

page 81

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ARTICLE HIGHLIGHTS

1889-1959, 70 YEARS OF RUBBER PROGRESS
Looking back over 70 years of service to the rubber industry, we see that the advances of the industry have often been great ones, but the tremendous explosion of technological progress of the last 10 years really stands out. **79**

URETHANE FOAM NOW MORE COMPETITIVE
The picture has changed since this author took a first look in mid-1958. Lower raw material costs for urethane and higher natural latex prices have narrowed the differential and made urethane foam more competitive. **81**

ANOTHER LOOK AT ANTIOZONANTS FOR SBR
A study on antiozonants for tires and other rubber products is presented and includes a visual rating method by which consistent ratings may be obtained. **86**

MARKET FOR PROCESS OILS RESEARCHED
This analysis of the current and future market covers rubber processing oils in the United States. The growth of oil-extended SBR polymers has expanded the market greatly. **97**

INTERNATIONAL RUBBER CONFERENCE PROGRAM
Final technical program and meeting details of this very inclusive meeting in Washington, D. C., in November are reported. **101**

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VOLUME 141, NUMBER 1 OCTOBER, 1959

CONTENTS

1889—RUBBER WORLD'S 70 YEARS—1959
. . . . . An editorial by R. G. Seaman 79

ECONOMICS OF FLEXIBLE FOAMS—A SECOND LOOK
. . . . . Peter B. Baker 81

WING-STAY 100 AS AN ANTIOZONANT
. . . . . J. C. Ambelang and B. W. Habeck 86

USE OF RUBBER PROCESSING OILS IN THE UNITED STATES, 1951-1967 97

INTERNATIONAL RUBBER CONFERENCE FINAL PROGRAM 101

The opinions expressed by our contributors do not necessarily reflect those of our editors

FEATURE DEPARTMENTS

News of the Rubber World 7
News from Abroad 8
New Equipment 18
New Materials 30
New Products 36
Book Reviews 52
New Publications 54
Meetings and Reports 101
Calendar of Coming Events 110
Washington Report 111
Industry News 113
News Briefs 116
News About People 120
Obituaries 130
Market Reviews 132
Statistics 138
Annual Index 147
Advertisers Index 153



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NEWS of the RUBBER WORLD

The rubber stockpile rotation program has come to an end. Present plans call for selling 40,000 tons in early 1960 and then to dispose of from 40,000 to 50,000 tons a year for the next nine years. This procedure would ultimately reduce the stockpile, which now is about 1.2 million tons, by 470,000 long tons. The necessary Congressional approval is expected to be forthcoming without trouble.

A 10¢-an-hour wage increase was negotiated by the five largest rubber companies and the URWA without having to resort to strikes. Goodyear Tire & Rubber Co. again set the pace when it signed up on August 31. Early in September the other four firms followed suit. Traditionally, these settlements will probably set the pattern for the rest of the major companies in the industry.

Congress closed up shop on the eve of Soviet Premier Khrushchev's visit with a record vastly different from that expected when the session began 8-1/2 months before. The so-called "liberal" 86th Congress failed to pass any really "anti-business" legislation and clamped down hard on organized labor which had claimed credit for helping to elect many members of the Democratic majority. President Eisenhower is given much credit for the conservative record.

Firestone Tire & Rubber Co. will be first American rubber company to produce its own nylon filament yarn for tire cord. Purchase of property at Hopewell, Va., has been approved, and modernization of the existing plant is expected to start in mid-November. Initial production is scheduled for late in the Summer of 1960. Other synthetic fibers may also be produced at this plant later.

"Project Hope," the first step in the plan called "The Great White Fleet," as outlined recently in Life magazine, has received support from a member of the rubber industry with the announcement by The Pioneer Rubber Co. that it would supply surgical gloves for the hospital ship's use. This ship, a symbol of peace, will sail in January, 1960.

NEWS from ABROAD

Recent Russian Rubber Research

Under the name of *Soviet Rubber Technology*, the Research Association of British Rubber Manufacturers recently began publishing an English version of the Russian rubber journal, *Kauchuk i Rezina*, and the first issue, June 1, 1959, presents a cover-to-cover translation of the January 1, 1959, number of the Russian paper.[1]

Cord Adhesives

Among the articles included in this issue are two reporting on investigations in Russia on carboxylated latices. The first deals with the synthesis of such latices and their use for impregnating tire cord; a method is described for preparing latices of butadiene-styrene, butadiene, isoprene, etc., with varying methacrylic acid content, involving polymerization in acid medium and the use of a redox system consisting of sodium sulfoxylate formaldehyde (Rongalite) and isopropyl benzene hydroperoxide.

It was shown that carboxylated latices increased the bond strength in rubber/cord systems without incorporation of resins. When carboxylated latex is combined with resorcinol formaldehyde resin, bond strength of viscose or Nylon 6 cord to natural and synthetic rubbers is greatly increased; optimum corresponds to a methacrylic acid content of 1.0 to 2.0% in the copolymer. Bond strength of viscose and Nylon 6 cord to carcass rubbers increases as the resorcinol formaldehyde resin content is increased, up to 12%. Mechanical properties of films of carboxylated latices, especially in combination with the resin, are considerably improved. Adhesive properties were found to improve as the number of styrene residues in the chain decreases.

Another article discusses electrodeposition of carboxylated latices as a method of coating fabrics. Here use was made of SKS-5-30 (a carboxylated butadiene-styrene latex containing 5% methacrylic acid) coagulated with 20% solution of calcium chloride or magnesium chloride. The magnesium ions in the latter serve simultaneously as coagulating and curing agent for polar polymers, in this case, the carboxylated latices; hence special curing agents and their stabilizers can be dispensed with when magnesium chloride is used. Adhesion of film to fabric was found to increase as pH decreases; optimum pH values range from 1.5-3.5. Adhesion can be further improved by adding emulsions of polymethacrylate or polymethylmethacrylate to the carboxylated latex.

Accelerators

A study of derivatives of 2-mercaptobenzthiazole and dimethyldithiocarbamic acid as vulcanization accelerators is also reported. The thiol hydrogen was replaced by a non-polar methyl radical (i.e., converting RSH into $RSCH_3$), and the hydrogen of the methyl group in turn replaced by various functions. One of the compounds obtained by such substitutions was benzthiazole - 2 - thiomethylenediethylamine, subsequently designated Accelerator BTMA, which was found to be of considerable interest as a vulcanization accelerator; it gives natural rubber and butadiene-styrene vulcanizates with tensile properties said to be substantially higher than are obtainable with MBT and practically identical in these respects with Sulphenamide Accelerator BT; at the same time it is cheaper than the latter and has the further advantages of being a crystalline product, stable, non-flammable, and of requiring no special method of incorporating in the rubber.

[1] RUBBER WORLD, July, 1959, p. 512.

Israel Has Growing Rubber Industry

Israel's young rubber industry consists of small plants in most cases. Started only 15 years ago, the industry today claims 42 plants with a combined work force of about 1,500 people. Among the biggest firms are the Alliance Tire & Rubber Co., employing 250, which collaborates closely with Dayton Rubber Co.; Samson Tire & Rubber Co., employing 200, set up by The General Tire & Rubber Co.; and Electric Wire Co., which employs about 135. While much of the production is tires, several companies make dipped latex toys and other articles; one firm makes foam rubber mattresses and cushions, and there are several well-equipped retreading plants. A rayon tire cord factory, near Tel Aviv, which began operations last year, is to be expanded to include the manufacture of Perlon (Nylon 6) and perhaps to begin production of a Dacron-type polyester fiber.

A planned major expansion is reported for the Alliance tire plant at Hadera. Costing about $2,000,000, half of which is to be raised in the United States, the expansion will include production of small-car tires for export to the United States.

Much Concern About Rubber Price, Supply

Several most important questions were agitating the rubber community in Malaya during September: What were the factors behind the sharp rise in rubber prices and the shortage of near rubber; what will be the procedure adopted by the United States in connection with the release of stockpile rubber; and what will be the effect of this stockpile rubber on the market?

The *Financial Times* of August 19, analyzing the problems, points to the heavy buying by Russia and satellites, and by Communist China, as the main cause of the price rise. Russia alone bought 107,768 tons of rubber from Malaya in the first seven months of 1959, or 64% more than in the same period of 1958.

In the effort to probe matters, even responsible people appear to be giving free rein to their imaginations; thus the British paper reports, "at least one prominent figure in the rubber trade" has detected in the Russian buying spree a plan to hoard rubber and then by dumping it later "to cause a collapse in the market and dislocations to the economies of Malaya and other producers"; and the shortage of near rubber has started rumors that a Chinese dealer in Singapore has cornered most of the available rubber. The *Financial Times*, of course, discounts both notions.

But it foresees two other dangers: the tremendous scope in England and Europe for a changeover to synthetic rubber, which will be favored by high prices for the natural product; and the depressing effects of the release of stockpile rubber. Which is not to say that it despairs for the future of natural rubber; its price will inevitably return to the level of synthetic rubber and it will always have a market.

In Malaya the opinion is freely expressed that the decision by the American Government to release stockpile rubber is timed to lower present price levels; it is realized that a fall in price could be offset by continued disturbances in Laos and increased demand from Communist countries, but it is

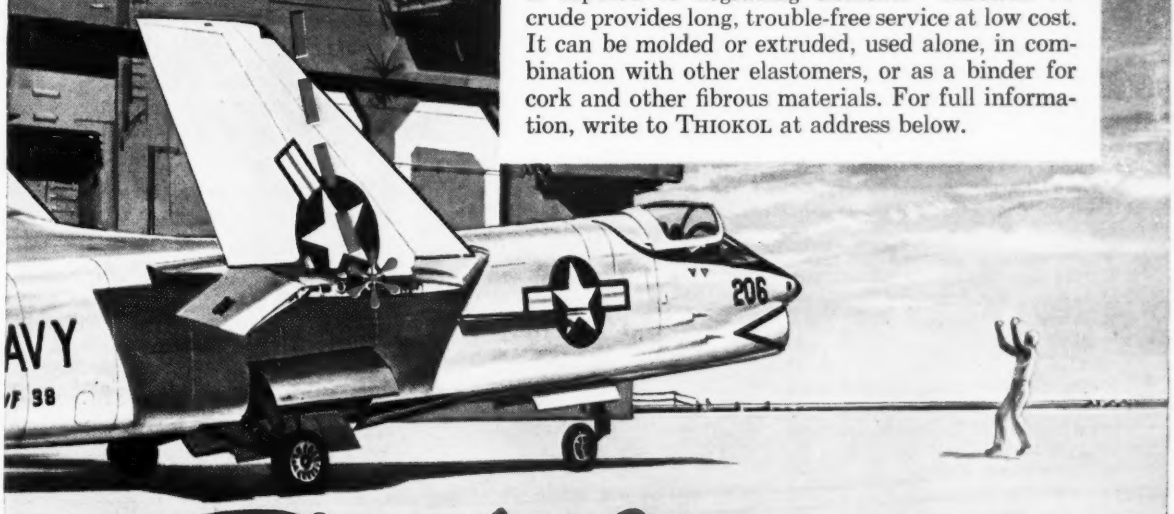
For the vital link
in a line
that must not fail...



The rubber connector between wing and wing tip in the Navy's Chance Vought Crusader jet fighter has a rough assignment. It must resist the aging effects of high powered fuel . . . stay resilient in the low temperatures of high altitudes. And because the wings of the plane fold back when decked, the part must withstand frequent exposure to strong sunlight, salt air and oil.

The Immel Engineering and Development Company, manufacturer of this vital link in the F8U-1 Crusader fuel line, found that one elastomer meets the demands better than any other—THIOKOL polysulfide ST crude.

In scores of industrial applications—where rubber is exposed to degrading elements—THIOKOL ST crude provides long, trouble-free service at low cost. It can be molded or extruded, used alone, in combination with other elastomers, or as a binder for cork and other fibrous materials. For full information, write to THIOKOL at address below.



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feared that the results on a quiet market could be serious. Worried rubber traders have been urging on the Federation Government the necessity of obtaining from Washington a guarantee that sufficient advance notice will be given of any release of stockpile rubber.

In connection with the foregoing, it is interesting to note that according to the *Straits Times* of August 4, rubber warehouses in the Federation were empty because traders had exported all available stocks, largely to beat the new duty which, including anti-inflationary cess, was expected to be 1¼ to 1½ cents (Straits) per pound.

The September 10 report of United Baltic Corp., Ltd., of London, discussing the shortage of near rubber, finds it difficult to see what could ease the situation.

"Even if some rubber were released from the American stockpile reasonably soon . . . it will not bring instant relief to other markets which at present are starving," it says.

We add that J. Bush, the Southeast Asian director of the Natural Rubber Development Board, predicts a deficit of 30,000 tons in the production of rubber this year, and a deficit of 600,000 tons between the end of 1959 and 1965.

Malayan Tire Factory

By the beginning of 1961, Malaya should have its own tire factory with capacity to supply the entire demand of the Federation, put at 500 tires daily. An agreement was signed by the manager for Dayton Rubber International, Dayton, O., U.S.A., Richard Rosenberg, and two local businessmen —Inche H. M. Shah, president of the Selangor Chamber of Commerce, and Shum Kwai Hong, president of the Malayan Rubber Goods Manufacturers' Association—according to which the American company will aid in the erection of plant, provide technicians and know-how, and train Malayan technicians in Ohio.

A $10,000,000 (Straits) company, Malayan Tire Corp., has been formed and is being financed locally. An up-to-date plant will be built on a 25-acre site at Petaling Jaya, and equipment valued at $6,500,000 (Straits) is to be bought from America. The plant will employ about 350 persons, and initial annual output has been set at 1,800,000 units, the local press states. For the first three years the factory will be operated with the aid of six Dayton technicians until enough Malayan technicians have been trained, so as to have a completely Malayan-run plant.

According to a late report, the government has declared the manufacture of tires and tubes, except for bicycles, to be a pioneer industry and so eligible for income tax relief.

Achieve 65-70% Replanting Target

The Malayan Rubber Replanting Scheme for smallholders ends in December. Initiated in 1953, it aimed by financial and other aid to induce smallholders to replant 480,300 acres of old rubber by the end of 1959.

The 1958 Report of the Rubber Industry Replanting Board states that to the end of last year, 250,000 acres, or slightly more than 50% of target, had been replanted. Progress was particularly disappointing in the early years of the scheme, but from 1957 on, interest increased, and the intensive publicity campaign carried to the villages in 1958, met with unexpected response; applications for replanting in 1959 poured in to reach a record of 136,341 acres. The report estimated that with this fillup, final figures would show at least 65-70% of the target of 480,300 acres replanted when the scheme ended —provided a sharp rise in prices did not tempt too many smallholders to delay replanting.

It is to be expected that since prices have mounted, many smallholders will indeed want to hold on to their old rubber as long as tapping is so profitable. Meanwhile, those who replanted in time, are now reaping the benefit of their foresight, Chinese smallholders, in particular, since the report shows that they replanted 60% of their areas, as compared with 40% by Malay smallholders.

Pelletized News

BRAZIL increased natural rubber consumption in 1958 by almost 4,000 tons over the 1957 figure; the total was 42,196 tons, including 1,241 tons of latex. In addition Brazil's rubber industry used 1,843 tons of synthetic rubber and 8,449 tons of reclaim. Local production of natural rubber lags increasingly behind the needs of the country's rapidly expanding rubber manufacturing industry. In 1958, such production amounted to only 20,268 tons, and this year estimates put domestic production of natural rubber at not more than 23,000 tons; while 1959 consumption of all rubbers is expected to rise to 60,000 tons. At the same time it is becoming more difficult to obtain the foreign currency to finance imports of raw rubber.

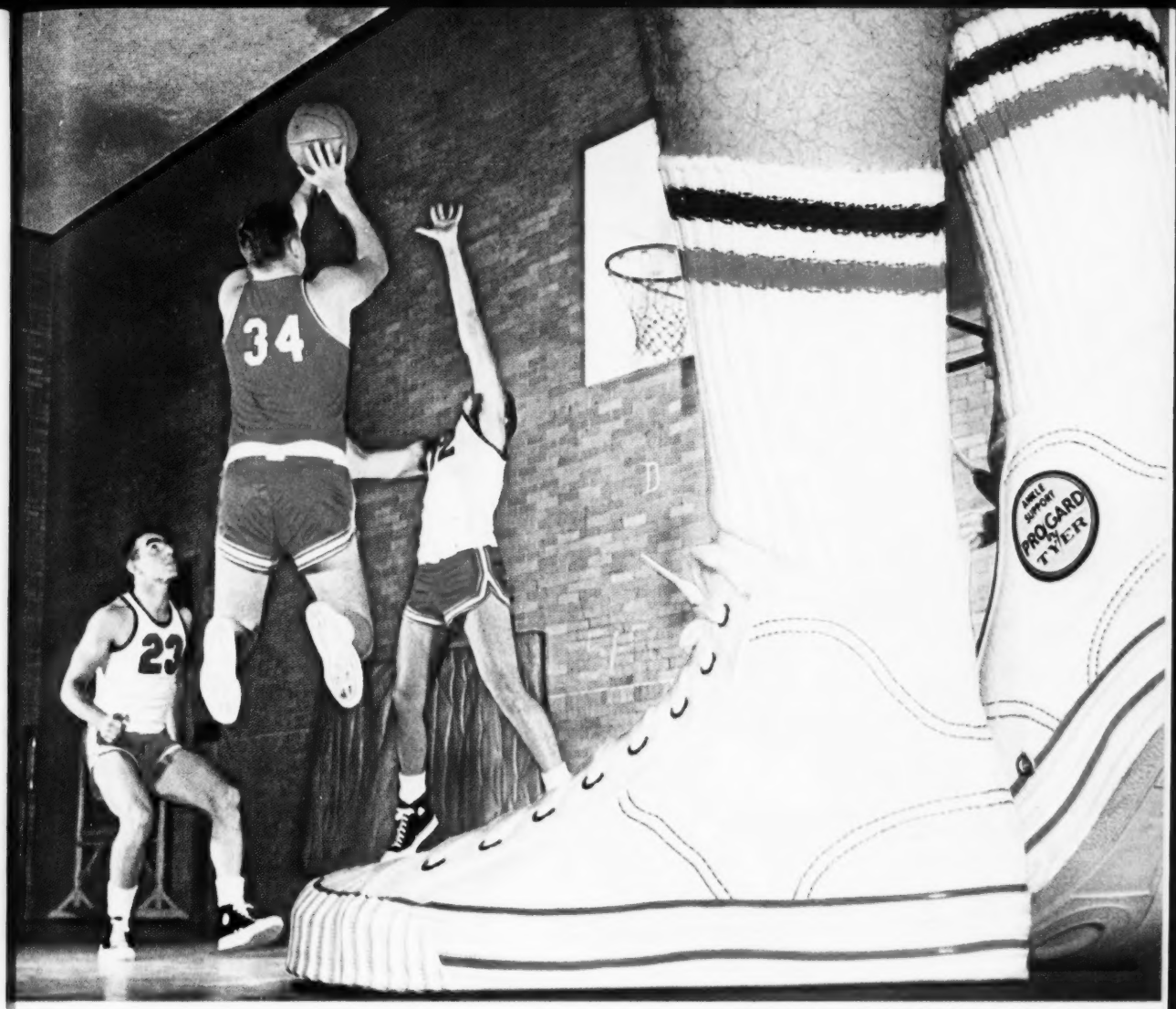
Imports of new rubber into Mexico during 1958 showed an increase of 17.8% by volume and 9% by value, over those for the prevous year; the totals, including both natural and synthetic rubber, but not latices, came to 27,538 metric tons, value 174,700,000 pesos, last year, against 22,634 metric tons, value 160,000,000 pesos, in 1957.

THE FIRESTONE TYRE & RUBBER CO., LTD., Bombay, India, has been awarded the National Safety Council's highest recognition, the Award of Honor, for completing 6,679,236 injury-free man-hours. The plant's employes worked 23 months without a lost-time injury and thus set what was said to be the world's safety record for industrial rubber goods plants. The award was made by Shri Shantilal H. Shah, Minister for Labour and Law, Government of Bombay, to Dr. S. V. Bhatt, chairman of the Bombay plant's safety committee. Under the same award plan Firestone's Buenos Aires, Argentina, textile plant received an Award of Merit, second highest award, for its outstanding performance in 1958. Employes at this plant worked more than 1,580,000 man-hours without an injury. Under the same plan Firestone's Brentford, England, plant was recognized for its safety performance in 1958. This plant also received the Award of Merit on the basis of a 68% improvement in the plant's accident frequency rate for 1958 over a previous three-year average. Employes achieved a frequency rate of 0.57 last year, as compared with the rubber industry average of 2.1.

The Grand Cross of the Order of Merit of the German Federal Republic was recently awarded to Paul Baumann, in recognition of his services in developing the electric arc process for producing acetylene, in converting production at Chemische Werke Huls to plastics, and also for his efforts in behalf of the new synthetic rubber factory at Bunawerke Huls.

THE LIBERIAN GOVERNMENT has reportedly come to an understanding with a Netherlands group on the establishment in Liberia of a company to be known as Liberia-Dutch Co. for Agriculture. The new company would improve and expand production of coffee, palm oil, sugar cane, and rubber in Liberia.

The manufacture of cheap rubber footwear in India has grown very much from its start in 1933. First production in India was started by Bata Shoe Co., with an annual production of 8,000,000 pairs. Bata was joined by a number of smaller factories, and although some were forced out of business during the war years, the post-war period has seen much increase in production, with a total of 36,000,000 pairs being made in 1958. Rubber consumption for this use increased from 200 tons in 1933 to 5,500 tons in 1958. Most of the footwear is consumed locally, but some is shipped to Far Eastern, Middle Eastern, African, and Western countries. With plastics threatening some of the export market, Indian footwear manufacturers are expanding research and development and trying to persuade the government to ease restrictions on necessary imports.



Footwear manufactured by Tyer Rubber Company, Andover, Mass.

How to get the jump on competition

You can't miss with a quality product that's got an exclusive feature of wide appeal. For example, consider the basketball shoes above. They offer everything you'd expect—sure-footed traction, light weight, good resilience, attractive appearance, easy washability—*plus* an "exclusive" that's caught on fast.

This sales-sparking "extra" is a combination ankle support and protective guard that's built right into the shoe. To produce this unique feature, a versatile sponge rubber compound was needed. Chosen: PLIOFLEX—for its unrivaled uniformity and good blowing characteristics.

In other parts of the shoe, PLIOFLEX was used because of its light color and remarkable retention of calendered designs. In the sole, PLIOFLEX provides outstanding nonslip qualities and exceptional flexibility. It also assures better adhesion of rubber to canvas. Throughout the shoe, PLIOFLEX means long wear. And—happily for the manufacturer—PLIOFLEX usually means a substantial reduction in costs.

If you're looking for a compound that can put your product on a better competitive footing, it will pay you to look into PLIOFLEX—now used in more products than any other synthetic rubber. For complete information, write Goodyear, Chemical Division, Dept. J-9418, Akron 16, Ohio.



GOODYEAR

CHEMICAL DIVISION

Plioflex—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio



"5352"—New Cushion Against Rising Costs

All-synthetic foam rubber is here—made from a new synthetic rubber latex by Goodyear. Its name: PLIOLITE LATEX 5352. Already interested: the automotive industry, furniture companies, shoe manufacturers—even firms that have never used foam before!

Why all this interest? PLIOLITE LATEX 5352 is of such high quality that it can be used alone, does not require blending with natural latex to produce an outstanding foam. *Result: foam rubber cushioning made from Goodyear's new* PLIOLITE LATEX 5352 *will be substantially lower in cost than any foam ever used in commercial products before.*

Another key point: because this new Goodyear latex is man-made, its fine quality will not fluctuate.

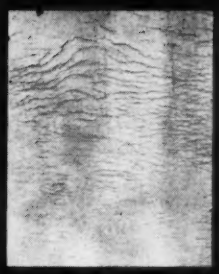
If your products can profit from a low-cost foam with excellent compression characteristics, good resilience, remarkable stress resistance and great durability – it will pay you to investigate PLIOLITE LATEX 5352. Write for details to: Goodyear, Chemical Division, Dept. J-9418, Akron 16, Ohio.



GOODYEAR

CHEMICAL DIVISION

Pliolite—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

SUNLIGHT AGING TEST (Styrene rubber)	 ANTIOXIDANT "A"	 ANTIOXIDANT "B"	 WING-STAY T
WINDOW AGING TEST (Styrene rubber) **Time to first crack, in weeks**	4	6	12
OXYGEN BOMB TEST (Extracted pale crepe gum stock–18 days @ 50° C. and 150 psi) **% Tensile retained**	0.0	26.7	81.4
% Weight increase	17.55	1.43	0.38
CREEP TEST (Styrene rubber gum vulcanizates – open tube @ 110° C.) **Hours to 20% creep**	10	17	28

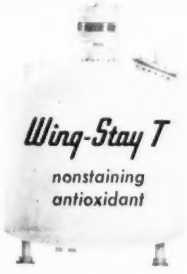
A case of more than meets the eye

The samples pictured above tell the more obvious part of the story: There's no beating new WING-STAY T when it comes to resisting discoloration under sunlight aging.

But there's even bigger news in the data under the samples. They clearly show the superior antioxidant activity–the greater protection for the rubber–offered by WING-STAY T as compared to other nonstaining antioxidants.

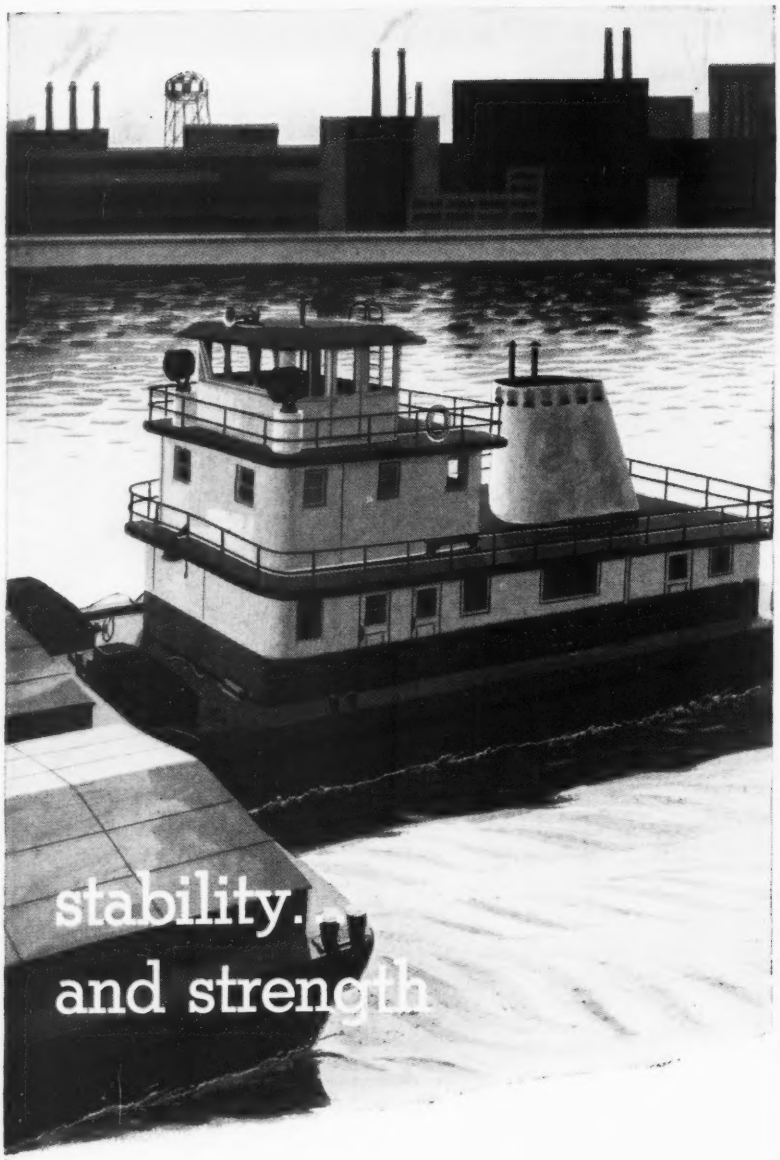
You'll find it worth your while to try WING-STAY T for the protection of compounded natural, styrene/butadiene or nitrile rubbers in any of the usual light-colored applications. You'll also find this nonhydrolyzable liquid well suited to the protection of raw polymers.

Full details, including the latest *Tech Book Bulletins*, on WING-STAY T are yours for the asking. And that's just part of the outstanding service you'll get on this and other products in one of the most complete lines of raw materials for the rubber industry. Just write to: Goodyear, Chemical Div., Dept. J-9418, Akron 16, Ohio.



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News from Abroad



H. G. Womack

B. F. GOODRICH CHEMICAL CO., has established a European sales office in The Hague, Holland, with operations scheduled to begin last month. Besides being the European sales headquarters for plastics materials, special-purpose rubber, and general chemicals, the Holland office will supply technical service information. Howard G. Womack, of BFG Chemical's international department, has been assigned to head the new office. He joined The B. F. Goodrich Co. in 1948 and later became a technical man in the products application laboratory of B. F. Goodrich Chemical Co. In 1955, he became a technical correspondent in the international department.

Very lightweight, but exceptionally strong tarpaulin material, called Wolfin HN and made of a synthetic fiber coated with a synthetic rubber compound, attracted much attention at the Hannover Trade Fair, held in Hannover, Germany, April 26-May 5, 1959. Wolfin S, a variation of this material, repels rubber, plastics, varnishes, and lacquers, it is claimed, and is recommended for use in the rubber industry as carrier belt in the foaming of rubber latex or Moltoprene. The foamed material is easily stripped from the carrier, which can then be reused. Lacquered or varnished furniture parts conveyed to drying ovens on such a carrier do not adhere to its surface. Unaffected also by molten tin, lead, and other soft metals as well as by splashes of fused salt, the material also may serve in making protective garments for those working with these substances.

INSTITUT DE RECHERCHES SUR LE CAOUTCHOUC AU CAMBODGE (Cambodian Rubber Research Institute) at Chup, was inaugurated on April 25, 1959, by a high-ranking representative of the King of Cambodia. President, general director, and research director are Messrs. Fournier, Simon, and Campagnon, respectively. According to data issued by the Indo-China Rubber Planters' Association, the principal estates in Cambodia produced 33,295 metric tons of rubber in 1958; exports in that year came to 33,207 tons, more than two-thirds of which (24,207 tons) went to the United States.





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- **MASTERBATCH**
- **GROUND STOCKS**
- **SCRAP RUBBER**
- **PLASTICS**

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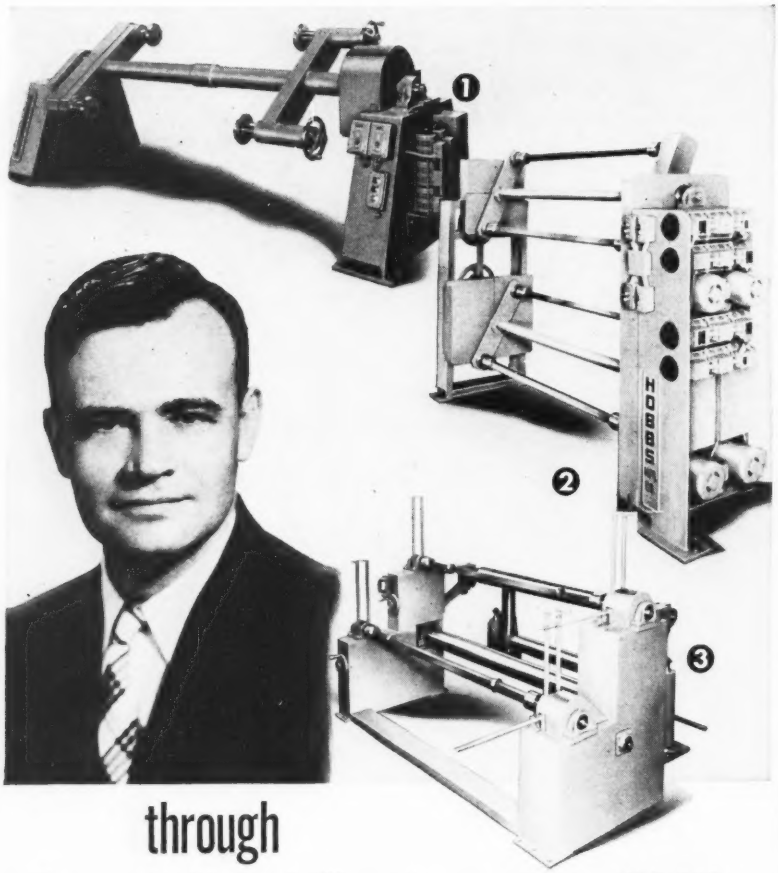
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Hobbs has designed winding equipment for dozens of America's leading firms . . . engineered winding operations in plastics, paper, rubber, textiles — wherever the winding requirement called for special skill.

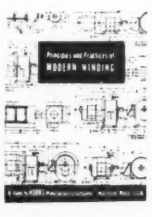
Start with Hobbs engineering whether the demand is a single winding device or a complete in-process winding installation . . . and you start with the assurance that you are hiring experienced engineers.

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2. FOR PLASTICS — Double Turret Extruder Winding Stand specially designed for prominent plastics manufacturer.

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51-9

News from Abroad

INDONESIA will not lift the ban on exports of slab rubber from South Sumatra to Malaya, it was officially announced. The restriction was imposed five years ago to insure that the four large remilling factories in Palembang, in South Sumatra, secure the greater part of the slabs produced in that area. Meanwhile Singapore remillers are feeling the lack of raw materials. They formerly got about 4,000 tons of wet slabs monthly from Palembang, but now their chief sources are South Borneo and Central Sumatra, from which they can obtain only an average total of 1,500 tons monthly.

Synthetic Rubber Report Available

The "Fourth Report of the Attorney General on Competition in the Synthetic Rubber Industry," dated July 1, 1959, just became available as RUBBER WORLD went to press.

The review of conditions and producer-consumer relations in the synthetic rubber industry in 1958, which is included in this report, will be summarized in the November issue of RUBBER WORLD.

Statement of RUBBER WORLD

Statement required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946, (Title 39, United States Code, Section 233) showing the ownership, management, and circulation of RUBBER WORLD, published monthly at Philadelphia, Pa., for October, 1959.

1. The names and addresses of the publisher, editor, managing editor, and business manager are: publisher, B. Brittain Wilson, 630 Third Ave., New York 17, N. Y.; editor, Robert G. Seaman, 630 Third Ave., New York 17, N. Y.; managing editor, S. R. Hague, 630 Third Ave., New York 17, N. Y.; business manager, Ralph L. Wilson, 630 Third Avenue, New York 17, N. Y.

2. The owner is: Bill Brothers Publishing Corp., Estate of Raymond Bill, Estate of Edward Lyman Bill, all at 630 Third Ave., New York 17, N. Y.

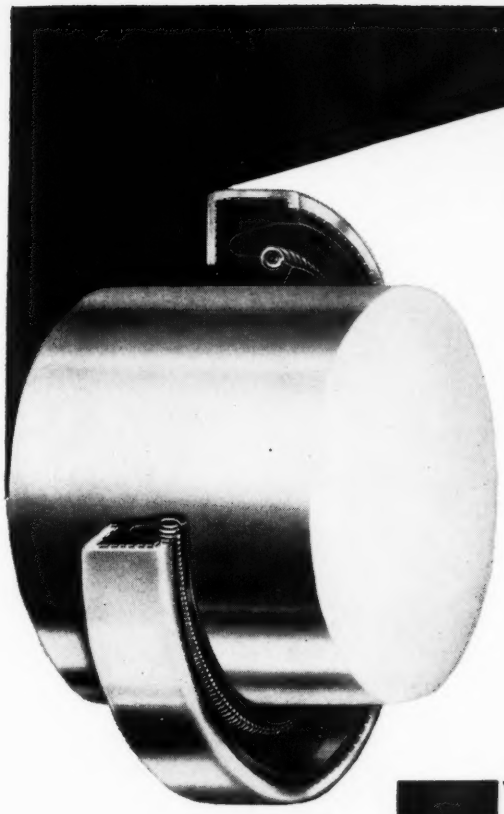
3. The known bondholders, mortgagees, and other security holders owning or holding 1% or more of total amount of bonds, mortgages, or other securities are: None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

B. BRITTAIN WILSON
Publisher

Sworn to and subscribed before me this 14th day of September, 1959.

[Seal] JOSEPHINE M. CIERO
Notary Public in the State of New York. No. 60-0638500. Qualified in Westchester County. Cert. filed in New York County.
(Commission expires March 30, 1961)



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The Lifetime Rubber-to-Metal Adhesive

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two-coat Adhesive System for bonding of Butyl Rubbers.

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two-coat Adhesive System for bonding Natural Rubber and GR-S Compounds.

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They keep oil in! . . . dirt out! C/R Bonded Rubber Oil Seals have an outstanding reputation for dependable performance . . . a major reason is TY-PLY, the rubber-to-metal adhesive that lasts a lifetime!

Why TY-PLY in C/R* oil seals?

*Chicago Rawhide—recognized leader in the sealing field—specifies TY-PLY for bonding the flexible sealing member to metal case in HD, HM and HMS Oil Seals. C/R reports the bond is completely permanent, enabling seals to deliver dependable, trouble-free performance. TY-PLY meets the widest variety of rubber-bonded applications—defies all shear, tension and compression forces—fulfills toughest static, dynamic and chemical requirements.

TY-PLY will adhere most vulcanizable rubber compounds to almost any clean metal surface.

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Marbon

NEW EQUIPMENT

Mark IIs Vacu-Blast Dry Honer



Mark IIs Vacu-Blast dry honer

Vacu-Blast Co., Inc. Belmont, Calif., is now marketing its Mark IIs model Vacu-Blast dry honer machine for cleaning rubber products molds. Mark IIs is a special model of the firm's industrial dry honer specifically designed for the molded rubber products industry. Its compact dimensions (24-inch width, 62-inch length, and 65¼-inch height with wheels) assure clearance even in low overhead or narrow passageway areas.

In operation, the machine delivers a high volume of microscopic Vacubrasive (glass bead) to clean mold surfaces at a low operating pressure which safeguards against damage. Mark IIs automatically reclaims and reuses its abrasive, separating out the debris, according to the company. Molds can be cleaned by this machine while they are still in the press. The dry cleaning method is said to impart a satin finish to mold surfaces and to eliminate the danger of wire brush damage to aluminum, cast-iron, or steel molds.

A compact unit that operates off existing plant electrical and air systems, Mark IIs is offered with a choice of cleaning enclosures and attachments

Catalog literature on the new machine is available from the manufacturer.

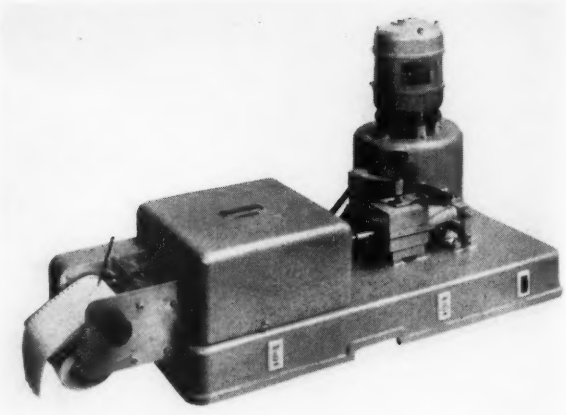
Wallace-Shawbury Curometer

The new Wallace-Shawbury Curometer, an instrument developed by the Research Association of British Rubber Manufacturers in conjunction with H. W. Wallace & Co., Ltd., Croydon, Surrey, England, is available in the United States from Testing Machines, Inc., Mineola, L. I., N. Y. The Curometer is a dynamic test machine used to indicate the change of dynamic modulus continuously during the curing of a rubber vulcanizate. The equipment is a simple mechanical device to operate, and the results correlate with tensile modulus and hardness measurements. The scorch time of a vulcanizate can also be obtained by use of the Curometer.

In operation, a rotating eccentric imposes a dynamic shear stress on a rubber test specimen. During subsequent vulcanization the dynamic stiffness of the specimen increases, and the resulting reduction in strain is magnified and recorded.

The machine consists of a motor-driven eccentric which imposes the shear stress on the specimen. The test specimen is in two halves housed between two oil-heated platens. Oil at the desired cure temperature is circulated rapidly through the platens by a motor-driven pump from a thermostatically controlled, electrically heated bath.

A flat paddle is sandwiched between the two halves of the specimen. The revolving eccentric is connected to the paddle in the specimen through a spring mechanism. The eccentric applies



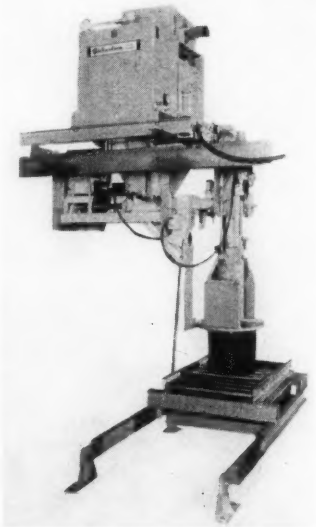
Wallace-Shawbury Curometer

a low-frequency sinusoidal vibration of constant amplitude to the spring mechanism. As the specimen vulcanizes, its stiffness increases, and the movement of the specimen paddle decreases. This movement is magnified mechanically and recorded on chart paper passing over a rotating drum.

The machine can be supplied for operation on any standard single phase electricity supply. Electrical consumption does not exceed 0.5-kw. Additional information and a descriptive brochure on the Curometer can be obtained from the distributor.

Richardson E-50 Scale Fills Drums or Bags

A new system that automatically weighs and fills drums or valve bags at a rate up to 600 pounds of material per minute has been introduced by Richardson Scale Co., Clifton, N. J. The system will handle crystalline chemicals with densities up to 40 pounds per cubic foot for fine powders and 100 pounds per cubic foot for free-flowing materials.

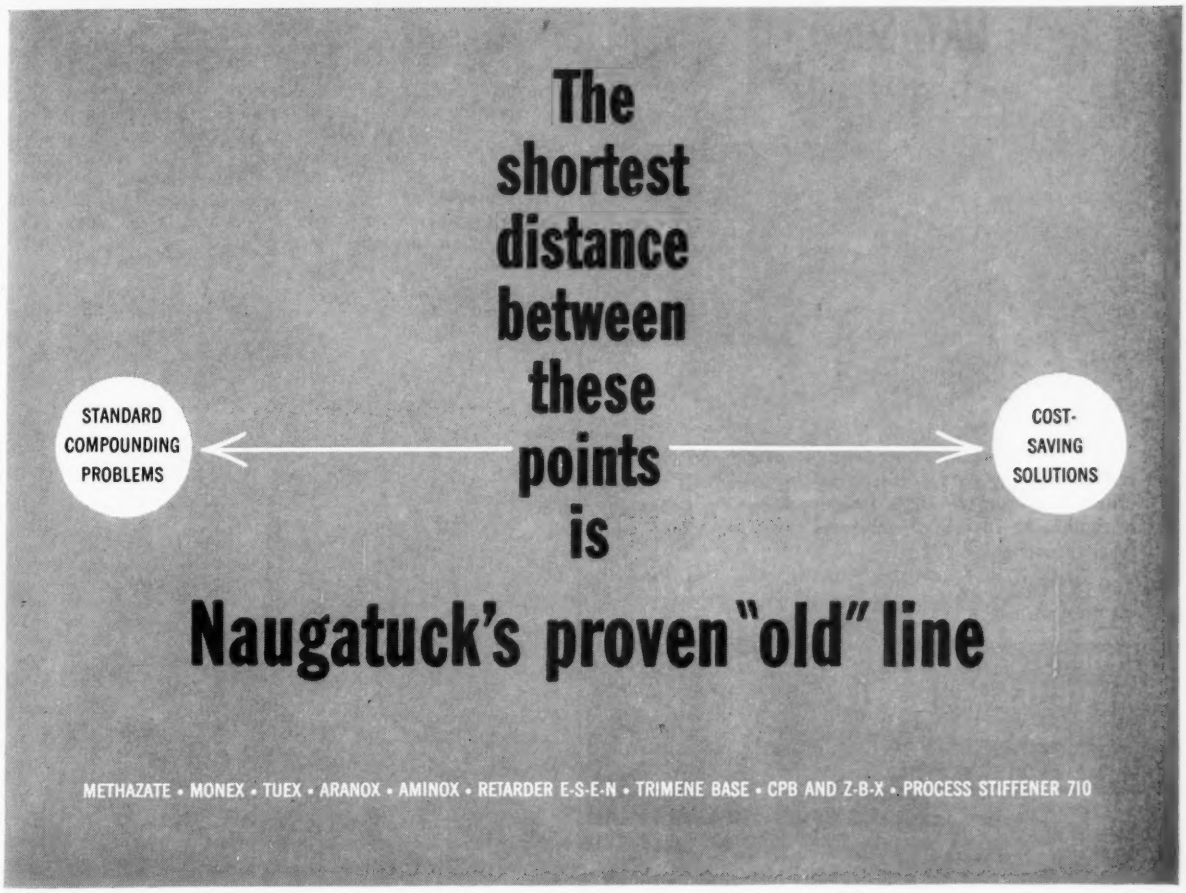


E-50 drum or bag scale

The filling sequence for drums is as follows. A frame supporting a heavy-duty gravity roller conveyor is raised by an air-operated lift actuated by foot-pedal. In the raised position, the conveyor carries the drum last filled to a station where the lid is applied and brings the next empty drum up to the filling position. As the conveyor returns to the depressed position, air-operated clamps automatically secure the empty drum. The filling tube then descends. As it does so, a drum cover at its base mates with the top of the durm to form a dustproof seal. The scale, which has been set to weigh one, two, three, or four times per drum, depending on drum capacity, now weighs out the entire contents for the drum and delivers them into the receiving hopper.

At this point, prior to filling, the material is compacted by a Stoker packer. The packer next conveys it to the filling tube, and it is then deposited in the drum. Material is shaken down into the drum by an air-operated, vibrating-type packer that is directly beneath the roller conveyor and is equipped with extension bars that protrude through the spaces between the rollers. Finally, the drum cover is raised, the roller conveyor returns to

NAUGATUCK **RUBBER CHEMICALS**



The Naugatuck name has been in the spotlight in recent years for the job its research laboratories have been doing in helping to solve many of the *tough, new* rubber industry problems. Most rubber compounders and manufacturers of rubber goods, however, know Naugatuck best for its standard everyday rubber chemicals.

The reason: Naugatuck's complete line of "old standbys" has proven time and again to be the best, most economical solution to everyday compounding problems.

Here are just a few of the many cost-saving Naugatuck rubber chemicals:

Methazate—Fast-curing ultra-accelerator
Monex®—Safe processing ultra-accelerator
Tuex®—Ultra-accelerator and vulcanizing agent
Aminox®—Ketone amine antioxidant imparting resistance to heat and oxygen aging
Aranox®—A strong amine antioxidant with a minimum of discoloration. A copper inhibitor
Retarder E-S-E-N—Effective antiscorch for processing safety
Trimene® Base—Excellent aging aldehydeamine accelerator and foam stabilizer
CPB® and Z-B-X—Positive-action room temperature curing accelerators
Process Stiffener 710—Stiffening agent for unvulcanized rubber.

For answers to special—or everyday—problems, look first to Naugatuck. Write for detailed information.

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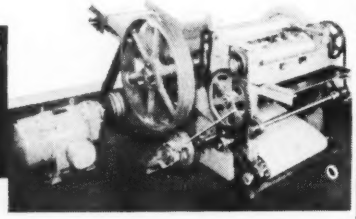
HAVE YOU A CUTTING PROBLEM? ONE OF THESE MACHINES MAY SOLVE IT



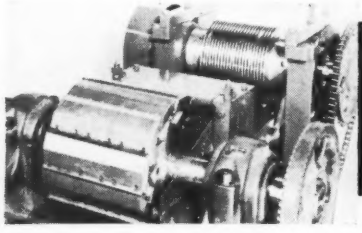
FOR MAKING ADHESIVES

Taylor-Stiles machines cut slabs of natural and synthetic rubber into strips for dissolving in solvents. "Has increased production 25%, improved quality, and made a significant saving of solvents" says important user. (Write for Folder 202.)

FOR CUTTING RUBBER or PLASTIC BLANKS



This machine cuts 5" x 5" rubber blanks from sheets. The sheets are cut into strips 5" wide which are cross cut into 5" lengths. One manufacturer gets 4648 blanks a minute cutting 6' x 2' sheets. (Write for Folder App. 213.)



FOR DICING PLASTIC STOCK

This high-speed, high-production machine cuts thin stock into short lengths. Produces up to 10 tons of pellets an hour. Widely used for clean-cut, uniformly-sized pellets without fines or longs. Other models for cutting thicker stocks and longer lengths.

Also laboratory and small production models.

For full description write for Folders 200, 213 and 216.

TAYLOR, STILES & COMPANY

16 BRIDGE STREET RIEGELSVILLE, NEW JERSEY

New Equipment

the raised position to advance the procession of drums, and the cycle is repeated.

Drums may be filled with from 90 to 400 pounds of material each. They may be any size in the range 14 to 32 inches high and 13 to 20 inches in diameter.

When the system is converted for filling valve bags, the drum cover is removed. Set up this way, the system operates as a single tube filler. Material metered out by the scale is deaerated by the Stoker packer, which then delivers it directly into the bag. Bagging operation may be maintained at the rate of six 100-pound bags per minute. Rate of operation of the packer is controlled by an adjustable timer.



Shaw-Box three-ton 'Load Lifter' air hoist

Series "700" 'Load Lifter' Air Hoists

A new line of heavy-duty, cable-type, air-operated hoists, designated Series "700" 'Load Lifter' air hoists, has been introduced by Shaw-Box Crane & Hoist Division, Manning, Maxwell & Moore, Inc., Muskegon, Mich. The line includes a complete selection of sizes for most industrial lifting needs from one-ton through 15 tons' capacity, with choice of lifts and suspensions.

These air hoists, designed for heavy-duty industrial service, are recommended for applications where corrosive or dirty conditions create maintenance problems or explosive atmospheres present a safety hazard for hoists with electric motors. Many parts of these air hoists are interchangeable with parts of the division's Series "700" 'Load Lifter' electric hoists.

Some operating advantages of the air hoists are: infinitely variable lifting speeds; one-hand pendant control cord for accurate load control; motors that cannot burn out from overload, they slow or stall; hoist can be completely serviced while suspended in the air.

Construction features include: modern compact design; main suspension frame that is a steel weldment; drum and sheaves of extra-large diameter, for long cable life; lower block totally enclosed for safe handling; helical load gearing with ball bearings throughout; positive acting load brake of the Weston roller ratchet type; foolproof upper limit switch to prevent over-travel of lower block; and five-cylinder, radial piston-type air motor with overlap of power impulses for even torque at all speeds.

Standard suspensions are lug-type push-type trolley, and hand-geared trolley. Motor-driven trolleys are available on special application.

Additional information is detailed in Bulletin No. 15005-9-59, which is available from the company.

(New Equipment continued on page 26)

Carbomix® 3760



To meet YOUR specific needs for a SUPERIOR NON-STAINING black masterbatch Copolymer has developed and now introduces

CARBOMIX® 3760

CARBOMIX® 3760

1. Is ECONOMICAL.
2. Saves mixing time.
3. Eliminates the handling of loose black.
4. Offers versatility in meeting product specifications.
5. Is designed *SPECIFICALLY* for use in molded and extruded rubber goods where non-staining properties are desired.
6. Is produced by the "Cold Rubber" process with black and oil SUPER-DISPERSED, assuring superior physical properties.

The formulation of CARBOMIX® 3760 *is:*

100 parts mixed rosin and fatty acid polymer

75 parts HAF black

37.5 parts naphthenic non-staining extender oil

12.5 parts naphthenic non-staining processing oil

1.25 parts non-staining stabilizer

COLD RUBBER SPECIALISTS

COPOLYMER CRCC RUBBER & CHEMICAL CORPORATION

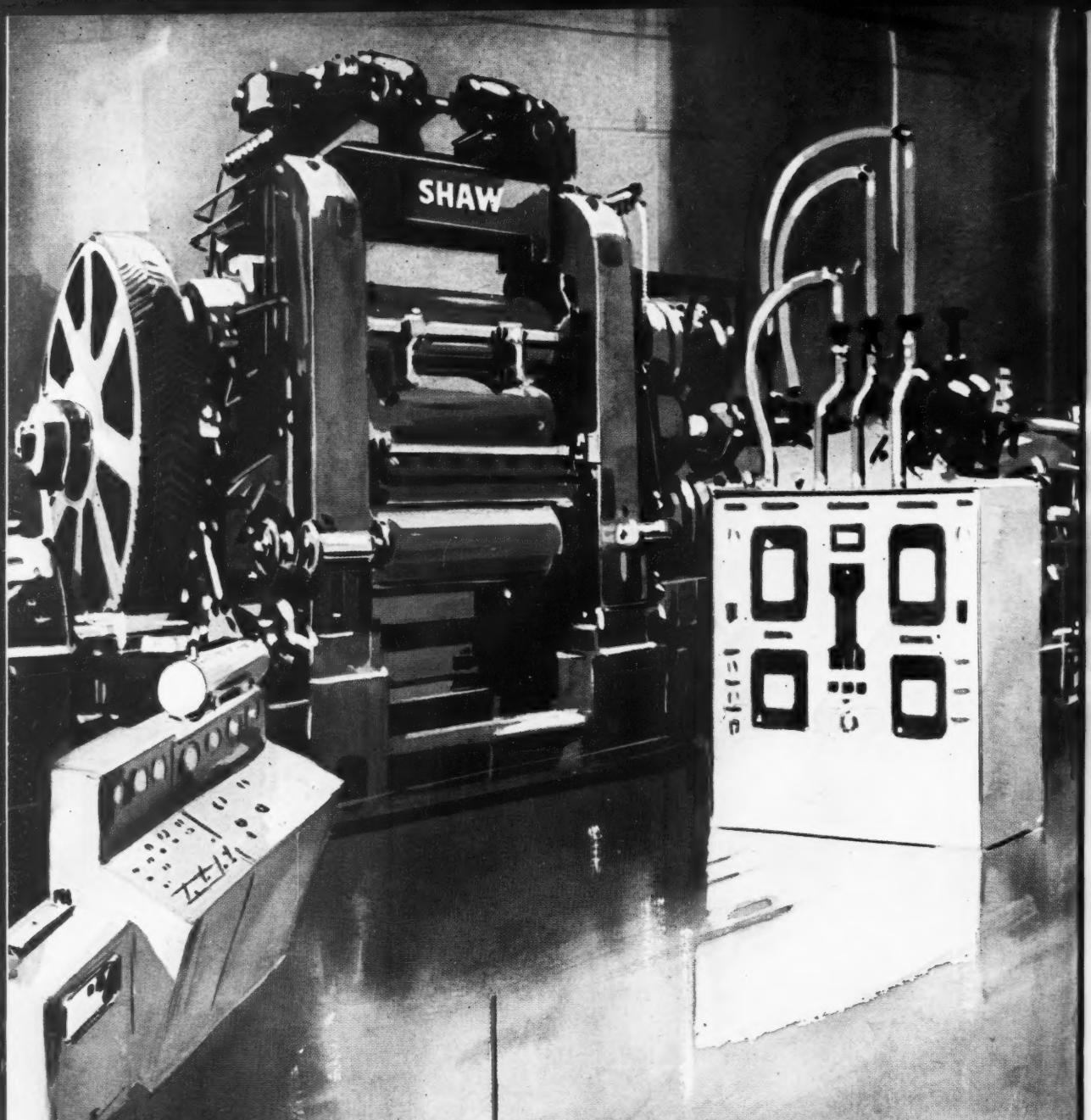
Samples or additional information will be furnished at your request.

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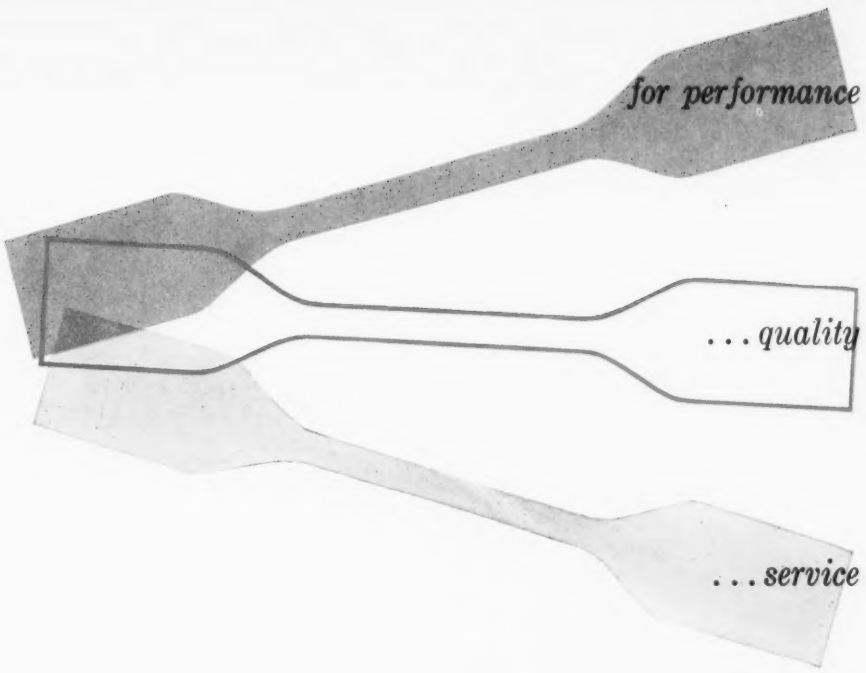
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5. Beta-ray recording and control.
6. Drilled rolls and heat exchanger for accurate temperature control.

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Accelerators	Polymerization Modifiers
Stabilizers	Latex Chemicals
Antioxidants	Accelerator Intermediates

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High Quality. As a major supplier of amines and organic sulfur compounds to industry, Pennsalt produces its own basic materials for rubber chemicals. You can count on quality that's controlled from raw materials to finished compounds . . . supply that's always dependable.

Technical Service. Pennsalt's modern rubber laboratory . . . staffed by skilled, experienced rubber chemists and compounders . . . is available to help you evaluate formulas, solve compounding problems.

Physical and chemical data, performance studies, evaluation samples of Pennsalt rubber chemicals are yours on request. A note or phone call will bring them to you quickly. Industrial Chemicals Division, PENNSALT CHEMICALS CORPORATION, Three Penn Center, Philadelphia 2, Pa.

*Trade-Mark Pennsalt Chemicals Corp.

See our Catalog in Chemical Materials Catalog

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Pennsalt Chemicals
ESTABLISHED 1850

How NS solved another bead wire problem

NEW PACKAGE inside steel "steam box" completely protected bead wire from rust during six week test.



VACUUM SEALING of new polyethylene bag keeps bead wire safe from corrosive atmospheres. After sealing, cardboard outer wrapper is added for additional protection before palletizing.



NEW NATIONAL-STANDARD PACKAGE PREVENTS BEAD WIRE CORROSION

A new bead wire packaging development from National-Standard permits storage of bead wire indefinitely without danger of rust or corrosion.

Now National-Standard is shipping bead wire in a vacuum-sealed polyethylene bag with a cardboard outer-wrapper to protect against scuffing and tearing. The polyethylene pack was made possible by National-Standard's development of reel-less coil packaging over six years ago.

EXTENSIVE TESTING of the new package over a period of many months has proved the new polyethylene package's superiority over old-style wrappers. National-Standard research engineers placed a new vacuum package, together with an old-style package, in the highly humid environment of a paper mill for several weeks. At the end of the test period, bead wire in the old package showed extensive rust. But wire inside the polyethylene bag was in excellent condition.

For additional proof, National-Standard put the new package through a torture test. For *six weeks*, new vacuum bag (wrapped with cardboard outer package) withstood extremely high humidity inside a steel steam cabinet *without any evidence of wire corrosion.*

NEW PACKAGING TECHNIQUE is a five step process: (1) polyethylene bag is placed over two bead wire coils; (2) a desiccant is placed inside bag; (3) bag is vacuum-sealed; (4) protective cardboard wrapper is placed around packaged coils; (5) entire unit is steel-strapped to pallet.

ANOTHER NATIONAL-STANDARD FIRST in the field of bead wire development, the new vacuum package becomes a significant addition to the long list of National-Standard contributions to the rubber industry. For over fifty years, National-Standard has been the leader in bead wire research and development. Whenever you have a *wire-in-rubber* problem, let National-Standard put this experience to work for you. For additional information, write National-Standard Company, Niles, Michigan.

Manufacturer of Specialty Wire for Rubber Products

NATIONAL NS NATIONAL-STANDARD Company NILES, MICHIGAN **STANDARD**

DIVISIONS: NATIONAL-STANDARD Niles, Mich.; tire wire, stainless, music spring and plated wires • **WORCESTER WIRE WORKS** Worcester, Mass.; high and low carbon specialty wires • **WAGNER LITHO MACHINERY,** Secaucus, N. J.; metal decorating equipment • **ATHENIA STEEL,** Clifton, N. J.; flat, high-carbon spring steels • **REYNOLDS WIRE,** Dixon, Ill.; industrial wire cloth • **CROSS PERFORATED METALS,** Carbondale, Pa.; decorative, commercial, and industrial perforated metals.

VULCANIZED VEGETABLE OILS

rubber substitutes

THE CARTER BELL MFG. CO.
SINCE
CARTER BELL PRODUCTS
1903
SPRINGFIELD, NEW JERSEY

Types, grades and blends for every purpose, wherever Vulcanized Vegetable Oils can be used in production of Rubber Goods— be they Synthetic, Natural, or Reclaimed.

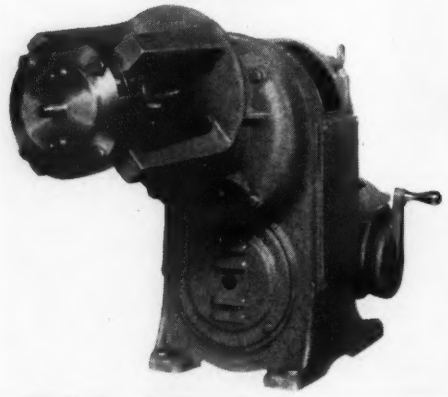
A long established and proven product

THE CARTER BELL MFG. CO.
SPRINGFIELD, NEW JERSEY

Represented by
HARWICK STANDARD CHEMICAL CO.
Akron, Boston, Chicago, Los Angeles, Trenton, Albertville, (Ala.), Denver, Greenville, S.C.

New Equipment

(*Continued from page 20*)



Model 4MV continuous automatic mixer

Oakes Continuous Automatic Mixer

The Model 4M Oakes continuous automatic mixer is now available from The E. T. Oakes Corp., Islip, L. I., N. Y. It is designed to fit the requirements of the laboratory for research, experimental, and small pilot-plant work. The continuous mixing of many products may be investigated, especially in the chemical industry. The new mixer lends itself to continuous mixing processes of all kinds and is especially adaptable to multiphase systems, reports the company. In any process where a chemical reaction depends upon constantly exposing fresh surfaces of one or more of the reactants, such as with latex foam and vinyl sponge, the new mixer is particularly indicated.

Two construction arrangements are available. Model 4MBH is provided with a bearing housing with shaft extension for belt drive from existing motors. Model 4MV is available with variable-speed power drive in three horsepower sizes, to provide a complete integral unit. The mixer is independent of additional equipment required, such as metering pumps, gages, or flowrator instruments.

The nominal capacity range of the Model 4M Oakes mixer is approximately 30 to 180 pounds per hour. The maximum capacity is dependent upon the products involved, the degree of mixing required, back pressure, and other factors.

Complete technical information on the new laboratory mixers and other Oakes mixers and blenders is available from the company.

New Mayer Mottle Cooling Unit

Mayer Refrigeration Engineers, Inc., Lincoln Park, N. J., has announced the design and manufacture of a new asphalt, rubber, or vinyl tile mottle cooling unit designed for maximum cooling with minimum floor space requirements. The new unit is designed to cool 10,000 pounds of mottle per hour with input temperature of 250° F. and outlet temperature of 75° F.

The new unit employs standard Mayer patented "spray-blast" rolls, and the conveyor is regulated with a variable-speed drive that synchronizes automatically with the operating speed of the mill or calender. The unit also has an automatic edge position control that maintains a uniform position of cooling roll belts.

The standard Mayer unit cools 10,000 pounds of mottle, ⅛-inch thick, 36 inches wide, and is said to save 700% in floor space, with cooling water temperature at 40-45° F., and operating speed up to 40 feet per minute. Dimensions of the unit are: length, 107 inches; width, 64 inches; and height, 95 inches. The basic unit can be designed to be adapted to variable plant requirements.

The manufacturer requests that production data be included with any request for additional information about this cooling equipment.

TIRE FABRIC PROCESSING EQUIPMENT

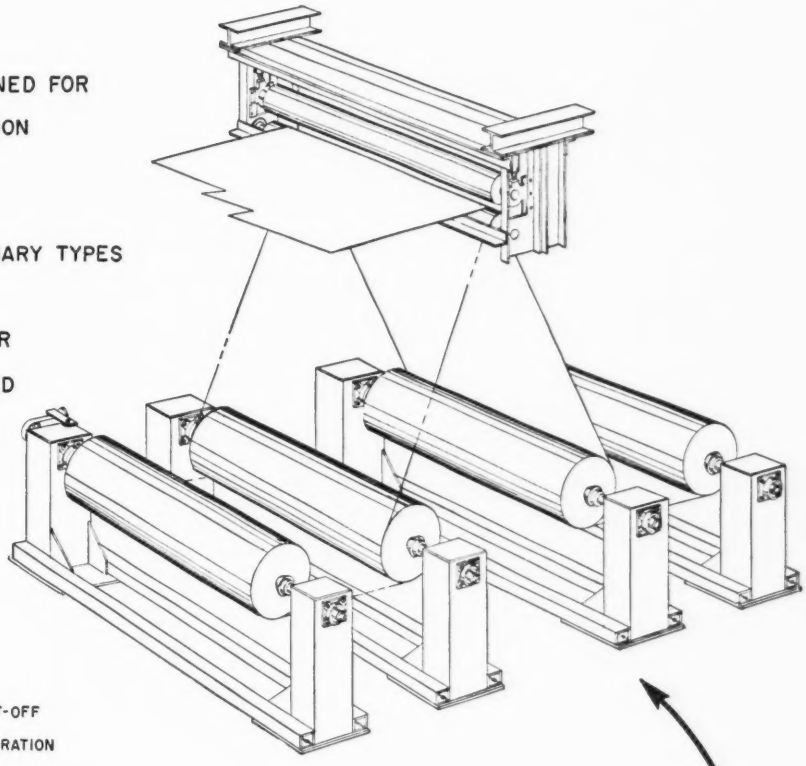
WIND-UP AND LINER LET-OFF STANDS

WIND-UP STANDS DESIGNED FOR
EITHER CONSTANT TENSION
OR CONSTANT TORQUE

OSCILLATING OR STATIONARY TYPES

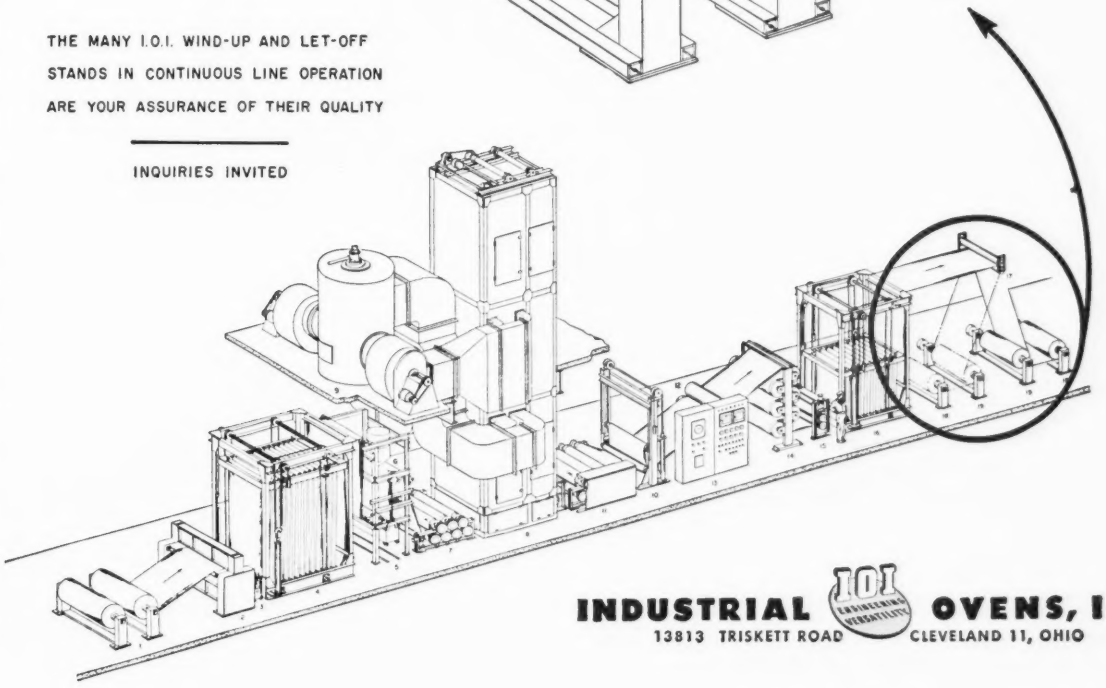
BULLHEADS MANUALLY OR
PNEUMATICALLY OPERATED

LET-OFF STANDS WITH
FRICTION BRAKES

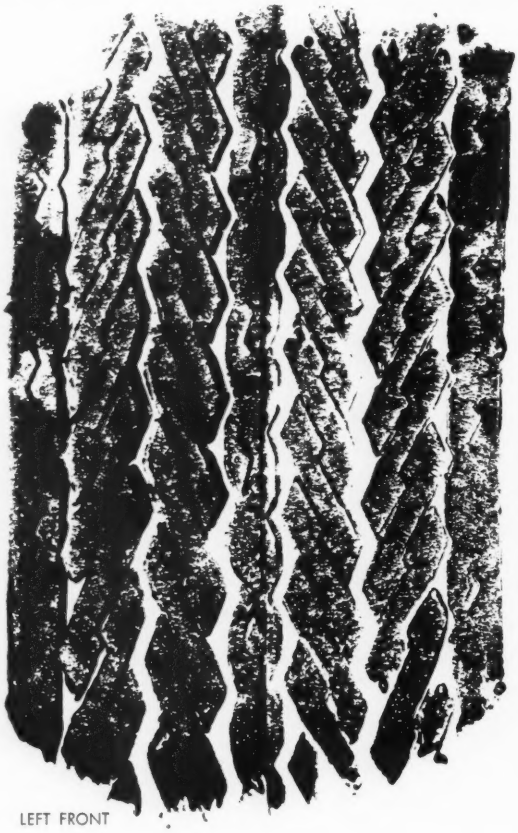


THE MANY I.O.I. WIND-UP AND LET-OFF
STANDS IN CONTINUOUS LINE OPERATION
ARE YOUR ASSURANCE OF THEIR QUALITY

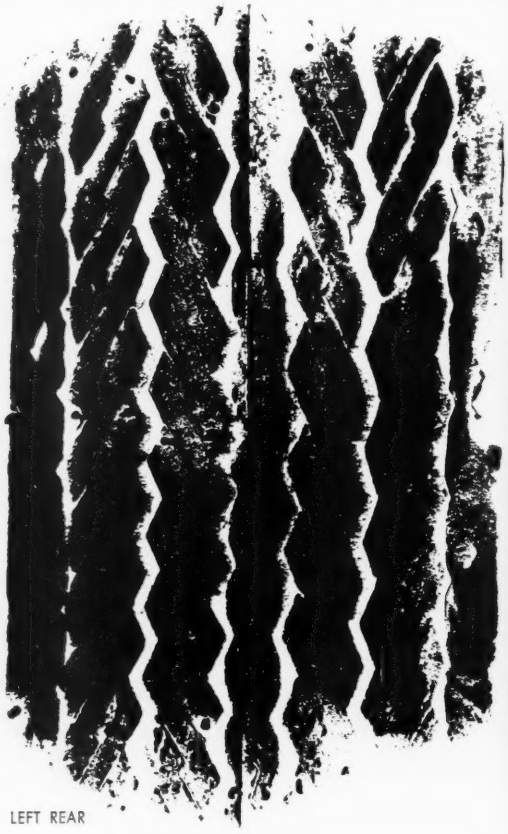
INQUIRIES INVITED



INDUSTRIAL OVENS, INC.
13813 TRISKETT ROAD CLEVELAND 11, OHIO



LEFT FRONT



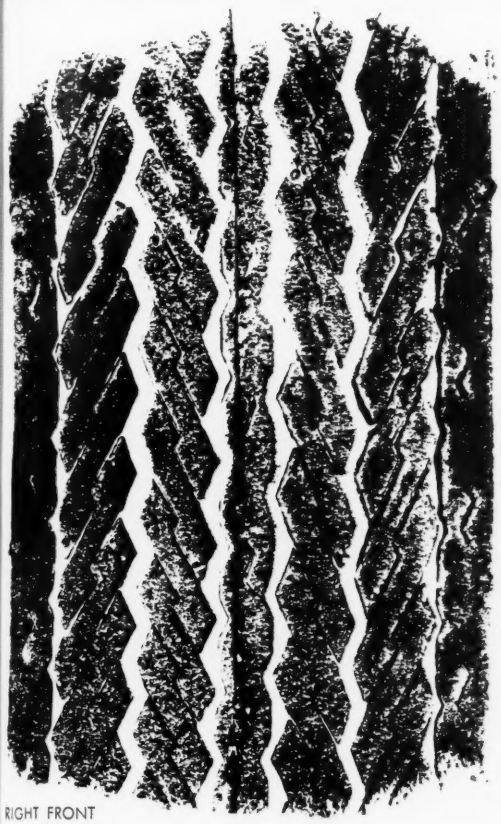
LEFT REAR

18 inches

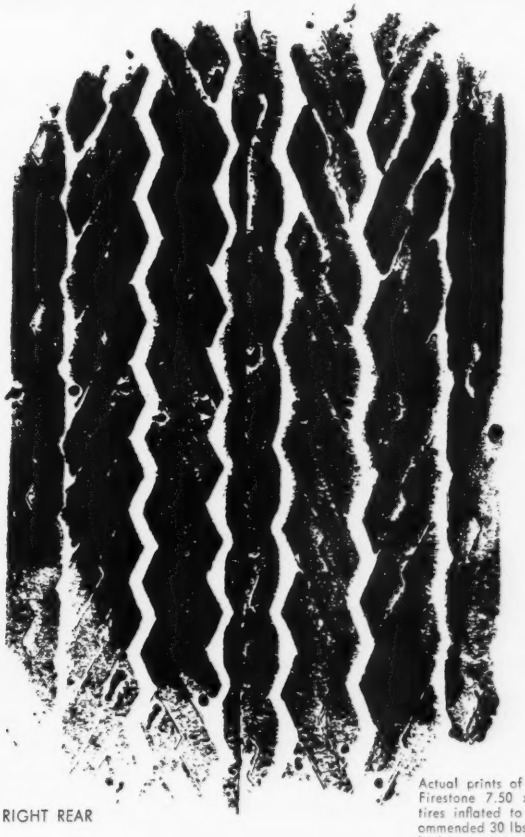
Safety's small



*TYREX is a collective trademark of TYREX INC. for viscose tire yarn and cord. The following producers are licensed to identify their viscose tire cord as meeting the standards of Tyrex Inc.: American Enka Corporation, American Viscose Corporation, Beaunit Mills, Inc., Courtaulds (Canada) Ltd. and Industrial Rayon Corp.



RIGHT FRONT



RIGHT REAR

7 inches

Actual prints of four Firestone 7.50 x 14 tires inflated to recommended 30 lbs. for highway cruising.

"footprints"

These prints were made by inking the tires of an ordinary passenger car and then lowering the car's full weight onto sheets of paper. It was done to dramatize the fact that your safety, your comfort and your total car investment ride the road on little more area than is covered by your own two feet. Obviously, then, you have real reason to be concerned about the *strength* of your tires.

Tires get their strength from the backbone of cord around which they're built. Most American tires are built around either nylon or the new TYREX* viscose tire cord. The most popular tire cord by far is Tyrex — and it is in the tires on *every* make of the new 1960 automobiles. Tyrex is the strongest, safest and smoothest-riding tire cord known to modern tire science.

We know Tyrex's superiority because, as a major world supplier of chemical cellulose (nature's basic material from which Tyrex tire cord is made) we played a substantial role in its development. May we suggest you do as the professional auto makers do — specify Tyrex when you buy tires.

RAYONIER

NATURAL RESOURCES CHEMISTRY

Executive and General Sales Offices
161 East 42nd Street, New York 17, N. Y.



The only explanation I have is that he must be in the neoprene business—and knows that MAGLITE is the key to superior scorch protection.

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The performance-proved magnesium oxide

Want to eliminate scorch damage in neoprene processing? Specify MAGLITE D. Tests prove that it offers better scorch protection for neoprene than any other magnesium oxide you can use. MAGLITE D also helps solve storage problems since it occupies about one-third the warehouse space as many of the lightweight magnesias. The benefits of using MAGLITE K, M, or Y for other elastomers and certain product or process requirements are equally impressive. For samples and technical information write to MERCK & CO., INC., Marine Magnesium Division, Department RW-5, Rahway, New Jersey.

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NEW MATERIALS

Nonox ZA Antiozonant

Introduction in the United States of Nonox ZA, a rubber antiozonant, has been announced by Imperial Chemical Industries, Ltd., of England. Arnold, Hoffman & Co., Inc., ICI's U. S. subsidiary, made the announcement and indicated that sales would be handled through Harwick Standard Chemical Co., Akron, O.

The new antiozonant is described as being 4-isopropylamino diphenylamine furnished in the form of dark brown or purple solid with specific gravity of 1.17. It disperses readily on open mills or internal mixers, according to the company, and is soluble in most natural and synthetic rubbers.

It was stated that Nonox XA gives a very high degree of protection against ozone attack and flex-cracking with good heat resistance comparable to the best antioxidants. The material was suggested for use by mechanical goods manufacturers for its effective static and dynamic protection as well as for tire manufacturers.

According to a bulletin on the material available from Harwick Standard Chemical Co., Nonox ZA is effective in natural rubber, SBR, butyl, nitrile, and neoprene. This antiozonant is claimed to have low volatility, little tendency to bloom, little odor, and only a small tendency to cause scorch. It is a staining-type antiozonant, however, and therefore is not recommended for light stocks or where there is a possibility of migration to light-colored materials. The recommendations call for use of 1.5 parts per 100 parts polymer in both natural and synthetic rubbers for normal use although up to four parts may be used in the synthetics, and two parts are recommended with sunproofing wax for static applications.

Polyethylene Separator Film

An improved Ger-Pak polyethylene separator film for the rubber tire industry and manufacturers and processors of mechanical rubber goods has been developed by Gering. Plastics Division of Studebaker-Packard Corp., Kenilworth, N. J.

The film is deeply embossed for added ease in the handling of gummy or tacky rubber stocks or polymers. It has the highest gloss, according to the manufacturer, of any commercially available polyethylene film and is produced in colors to match customer specifications. The film is extruded from virgin polyethylene and yields physical properties higher than those previously available to the rubber industry, particularly in tear strength.

Also available is a smooth-surface version of Ger-Pak for wrapping bales of rubber, fuel cell liners, silicone rubber electrical insulation, or similar use.

A technical bulletin is available from the company with samples of the film in 3-, 4-, and 4½-mil thicknesses and in blue, red, and green colors as well as a sample of the clear, smooth film. Other colors and gages are available to meet specific requirements.

•

"FR-S 173" (Revised); **"FR-S 178"** (Revised); **"FR-S 181"; "FR-S 182"; "FR-S 184"; "FR-S 110"; "FR-S 168"; "FR-S 176"; "Ammoniated Natural Latex (S-4 Latex)"; "Low-Ammonia Natural Latex (X-2B)."** Synthetic Rubber Facts sheets of the Firestone Synthetic Rubber & Latex Co., Akron, O.



Safety at sea begins with Ameripol Rubber

The *Randy Boatshu* is a natural for sailors on slippery or wet decks. The specially designed sole gives it perimeter traction action that grips tight when the weight is shifted in any direction.

Ameripol 1703 proved to be *the preferred rubber* for use in the vulcanized shoe sole blend. Reasons: its superior uniformity . . . well known stability in processing and excellent physical properties. This rubber is ideal for shoe soles, molded and extruded goods, floor tile, sporting goods and toys.

You'll find that Goodrich-Gulf service starts with matching the right rubber to your product needs. It includes packaging improvements to cut your handling costs . . . convenient shipping points to save time and warehousing expense. For information, contact Goodrich-Gulf Chemicals, Inc., 3121 Euclid Avenue, Cleveland 15, Ohio.

Ameripol
THE PREFERRED RUBBER

P. S. *If you're a sailor yourself, the Randy Boatshu is made by Randolph Shoe Company of Randolph, Mass.*

Goodrich-Gulf Chemicals, Inc.



Buxbaum matting resists the "batter of little feet" with Ameripol Micro-Black masterbatch

"Our Traffic-Master floor matting is made especially for schools and other heavy-traffic buildings," says the Buxbaum Company, Canton, Ohio. "It *has* to be tough. That's why we make all our black matting with Ameripol Micro-Black—for greater abrasion resistance."

Key to Micro-Black's better abrasion resistance is superior dispersion of carbon black in the rubber, achieved by an exclusive process—high liquid shear agitation at the latex stage. Products made with Micro-Black are more saleable because they have controlled uniformity, greater resistance to wear.

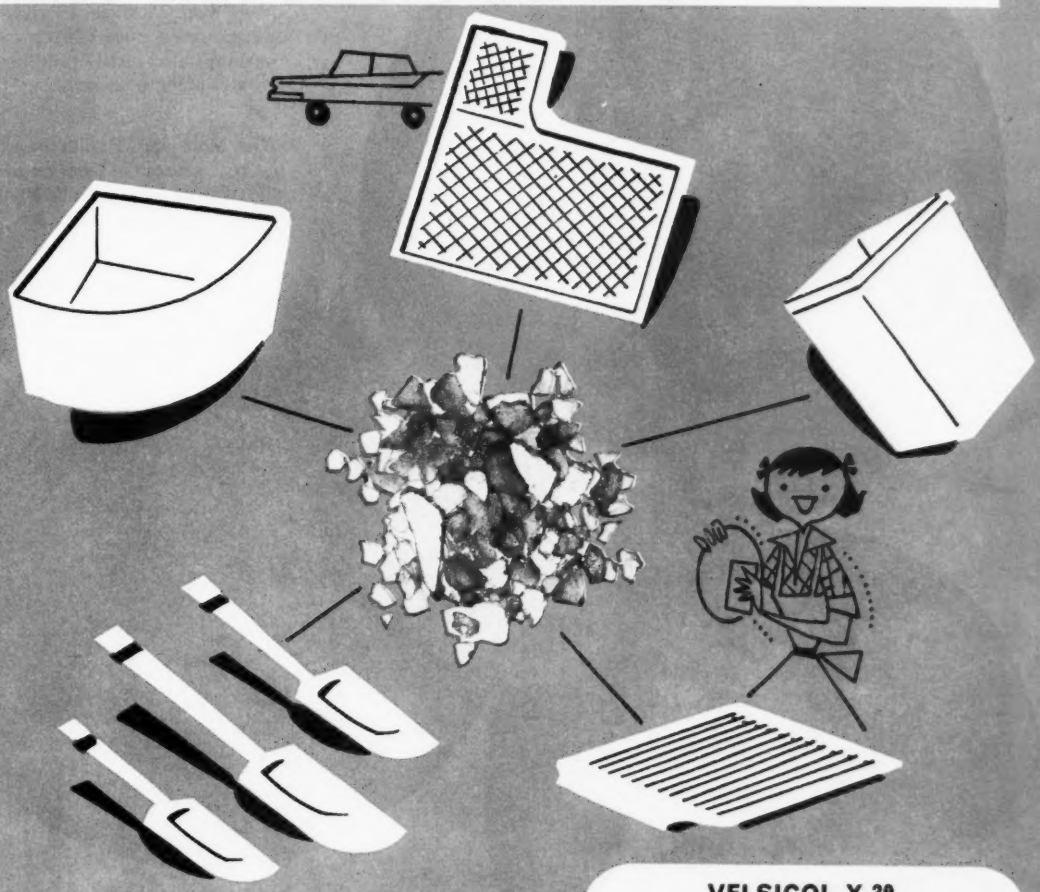
Other Micro-Black advantages reported by Buxbaum: Lower initial cost, easier and faster mixing, no messy handling of loose carbon black.

Improve *your* products and reduce processing costs with Ameripol Micro-Black. For complete information on all eleven types, write for new illustrated Micro-Black data book.

Goodrich-Gulf Chemicals, Inc.

3121 Euclid Avenue, Cleveland 15, Ohio / Plants at Port Neches, Texas, and Institute, West Virginia

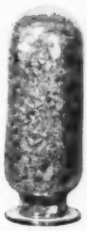
VELSICOL X-30 HYDROCARBON RESIN
makes mat stocks behave!



VELSICOL X-30
HYDROCARBON RESIN

Mat stocks and other stocks with high clay loadings can be made pliable and easy to process by adding Velsicol X-30 hydrocarbon resin to the recipe. X-30 enables you to use the highest clay loadings without sacrificing tensile strength, elongation, or processing characteristics. You'll get better milling, calendering, and tubing. Cures will be more uniform, and stocks non-scortchy. Toughness, hardness, and resistance to aging and abrasion will be improved. Raw materials costs will be lower, too. Write for complete information about Velsicol X-30 resin today!

PHYSICAL PROPERTIES,
VELSICOL X-30 RESIN



Type: Thermoplastic Hydrocarbon
Form: Flaked
Softening point (ball and ring): 210°—220°F.
Color (coal tar scale): 1½—2
Color (Gardner): 10-11
Color (Rosin scale): I—K
Acid No.: 0-2
Saponification No.: 0-2
Compatible with a variety of natural and synthetic rubber compounds. Has good electrical insulation properties, because it is a hydrocarbon polymer.

VELSICOL



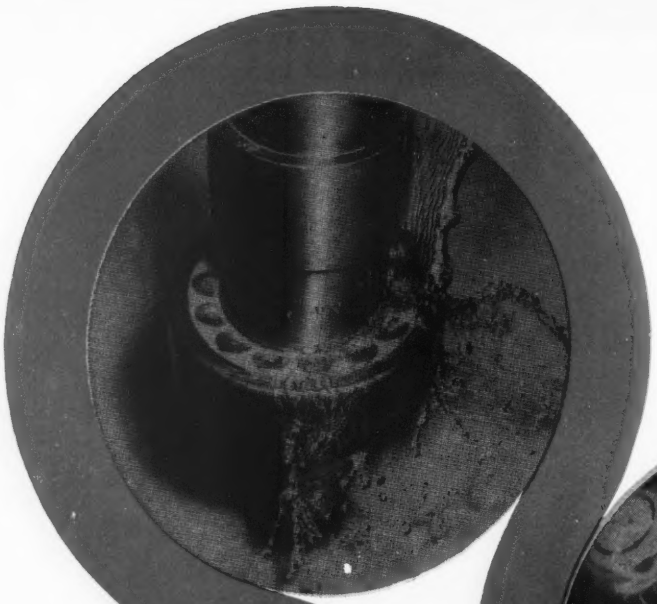
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Gentlemen: I am interested in more information about your X-30 resin.
☐ Please send literature
☐ Please send test sample
☐ Please have salesman call
RW-109

Name_____
Company_____
Address_____
City_____ Zone_____ State_____



Water Wash: Mobilplex EP clings to surfaces even under direct water washing; also resists mild acids, metal-working emulsions.

Heat: Mobilplex EP holds consistency, resists runout at temperatures in the range of 300 F. Can be pumped at sub-zero temperature, has low shear resistance.





Extreme-Pressure: Mobilplex EP has shown excellent results in Timken OK-Load, 4-Ball Wear and similar tests. It has unusual capacity to withstand severe shock loads as evidenced by outstanding performance in heavy-duty equipment.

LABORATORY TEST SUMMARY RESULTS
MOBILPLEX EP (M) and 5 Leading Competitive EP Greases (A,B,C,D,E)

PROPERTY EVALUATED	RATING			
	Excellent	*Good*	*Fair*	*Poor*
Heat Resistance	M	A	C,D,E	B
Service Performance	M	A,C,E	B,D	
Extreme Pressure	M ,A,C	B,D,E		
Anti-Wear	M ,A	B,C	D,E	
Rust Protection		M ,B,C, D,E		A
Water Resistance		M ,B,C	A,D,E	
Handling Properties		M ,A,B C,D,E		
Controlled Bleeding		M ,A,C	B,D,E	
Non-staining		M	A,B, D,E	C

announcing Mobilplex ep

The Multi-Service Grease with unique Calcium EP Complex. Never before in a single lubricant such a wide range of use . . . such a margin of superiority . . . such a potential for maintenance savings!*

From Mobil research comes Mobilplex EP . . . a Multi-*Service* extreme-pressure grease far superior in quality and range of applications to any multi-*purpose* grease available.

The unique Calcium EP Complex, special additives and extremely tenacious nature of Mobilplex EP, provide maximum protection against wear, rust, washout and heat. Because of its greater versatility, Mobilplex EP goes further than competitive extreme-pressure greases in simplifying your lubricant application, storage and purchasing problems. This new-type lubricant has given industrial machines greater protection while replacing as many as seven other greases. Mobilplex EP has all of the advantages usually associated with EP greases—as well as excellent storage, structural and oxidation stability.

Examination of the laboratory summary at left shows that in comparison with five leading extreme-pressure lubricants Mobilplex EP is the *only* grease excellent or good in every grease quality tested. No wonder aluminum and steel plants, forging and metal-drawing shops, the cement, chemical and rubber industries, steel and paper mills are reporting dramatic success with Mobilplex EP.

For full details contact your Mobil representative.

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**Multi-Service means ideal for all types of anti-friction and plain bearings under all normal operating conditions (temperatures in the range of 300 F.) and for all types of dispensing equipment.*

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Magnesium Oxide
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Pumice
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MAGLITE® D
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MAGLITE® M
MAGLITE® Y

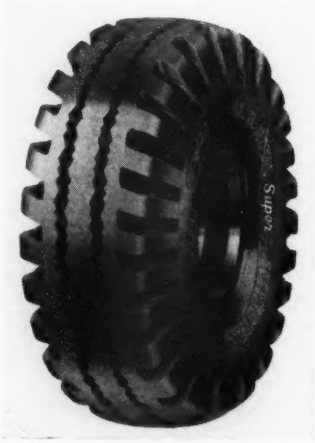
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WHITTAKER®

Whittaker, Clark & Daniels, Inc.
100 Church St., New York, N. Y.

NEW PRODUCTS

U.S. Truck Tire



U. S. Royal Super Fleetmaster, Safety Steel Shield

United States Rubber Co., New York, N. Y., has developed a truck tire designed to take the impacts of off-the-road terrain and to withstand the heat and wear generated by highway speeds with heavy loads. The new tire, called the U.S. Royal Super Fleetmaster, Safety Steel Shield, features a combination of double-strength nylon tire cord and steel cable. Multiple plies of nylon cord are used in the carcass to protect against breaks and blowouts. Two layers of steel cable are used under the tread to protect against cuts and ruptures in the tread area.

The tire is said to run about one-third cooler than most truck tires marketed currently. Its tread is deep for off-road running; yet it has sharp traction edges for skid control and traction on the highway. It has been tested for more than a year in test fleets operating both on and off the highway, with record mileage and durability.

This tire is recommended for such heavy service equipment as dump trucks, liquid tankers, dry cargo tankers, ready mix cement trucks, logging trucks, oil-field rigs, loaders, and yard lifts. The tire comes in sizes ranging from 7:50-20 to 11:00-24 in both tubed and tubeless construction.

The new tire is priced, depending upon size, at about 20% above standard rayon cord original-equipment truck tires.

New Light-Duty Ray-Man Poly-V Belt

Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N. J., has added the Poly-V "J" belt to its line of power transmission products. Poly-V "J" is especially designed for high-speed small-pulley transmission applications.

The new belt will operate over sheaves as small as 0.8-inch pitch diameter. Pitch lengths range from eight to 98 inches. The new belt is designed to deliver power with substantially less belt width than would be required using a standard belt drive owing to a single endless rubber belt with a series of parallel V-ribs molded lengthwise around the inside circumference. Sheave grooves are designed to mate with the belt ribs, and the load is evenly distributed across the full width of the drive member.

In addition to economy of operation, the manufacturer claims these advantages for the new belt: less space required, outstanding performance with small sheaves, quiet vibrationless drive, positive tracking, durable operation, small mounting clearance and takeup requirements, overload slip protection, and good resistance to heat and oil.

Poly-V "J" is recommended for any belt drive application except where variable pitch or adjustable sheaves are required or where positive speed ratios are essential. This belt is particularly

(Continued on page 40)



with STAN-TONE colors for plastics or rubbers

Almost is not good enough. Working with hundreds of standard Stan-Tone pigments, Harwick laboratory men mix test batch after test batch until they arrive at an ***exact match*** . . . in hue, intensity and value.

This conscientious color control is followed through from formula mix to shipping container. Shipment after shipment, you receive color which is carefully matched to your original sample . . . and has uniform working qualities.

Pigments are selected for their brilliant masstones and for compatibility. Heat and light stability and high resistance to migration, crocking, bleed and other compounding problems are built right into the color materials. The Harwick man has full data on behavior of specific pigments in organasols, plastisols, PVC, polyethylene and rubber.

Stan-Tone colors are available dry, dispersed in plasticizer, in polyester resin or in polyethylene, and in masterbatch in rubber elastomer.

- **STAN-TONE** *Dry Colors Organic and Inorganic*
- **STAN-TONE** *PEC Polyester (Paste)*
- **STAN-TONE** *PC Paste (In Plasticizer)*
- **STAN-TONE** *MBS Masterbatch*
- **STAN-TONE** *GPE (Polyethylene)*

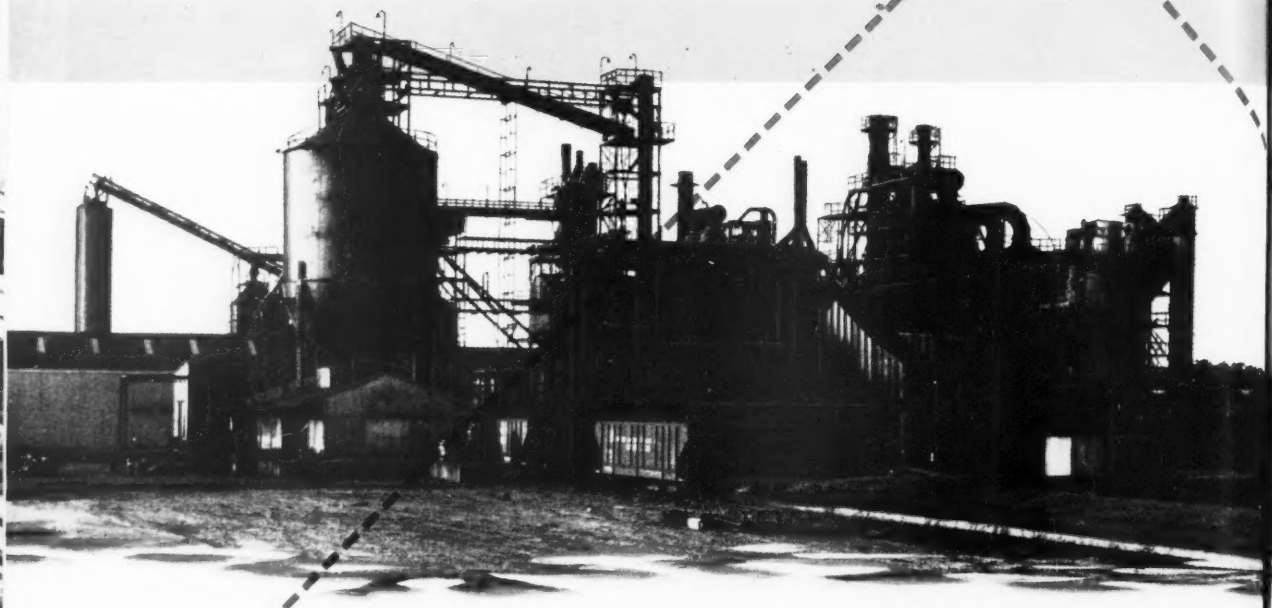
WRITE for Technical Data on STAN-TONE Colors . . . .

HARWICK STANDARD CHEMICAL CO.

60 SOUTH SEIBERLING STREET, AKRON 5, OHIO

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Ivanhoe



a curious name for a Carbon Black Plant

United Carbon's Ivanhoe furnace black plant wasn't named by a lover of Sir Walter Scott's romantic novels: it simply happens to be on land once a part of the old Ivanhoe sugar plantation in southern Louisiana.

This Ivanhoe is a big, busy and efficient carbon black facility. Its KOSMOS 60 (HAF) and KOSMOS 20 (SRF) blacks go everywhere . . . in bags, by rail, and by barge via the Intercoastal Waterway.

The KOSMOS seal on Ivanhoe-made blacks means top quality. Specify KOSMOS 60 for extra mileage tires and tread rubber with outstanding resistance to cuts and cracks; call for KOSMOS 20 for highly loaded rubber goods, for easy, cool mixing, low heat generation and high resilience.

Ivanhoe — a curious name for a carbon black plant: but a name meaning United Carbon quality throughout the rubber industry!

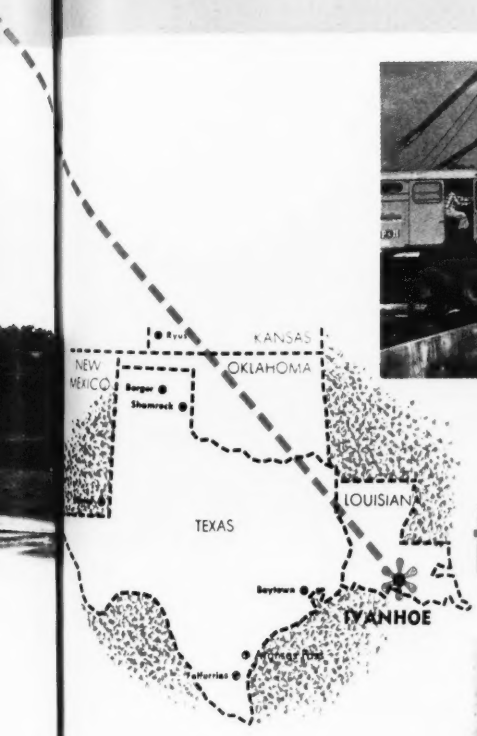
UNITED CARBON BLACKS

Carbon Blacks of Excellence

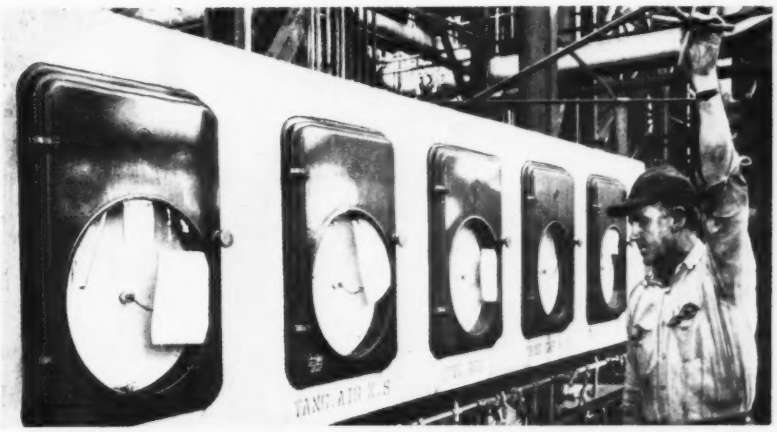
for KOSMOS 60
for KOSMOS 20







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In the case of
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Each is manufactured to rigid specifications for copper and manganese content, pH value, soluble salts, fineness, color, tint and strength by controlled processes and with special equipment.

If you haven't already done so, try these finest of all oxide colors. Our 79 years of experience in the pigment business is your guarantee of absolute uniformity of pigment product.

"See your Williams representative" or write direct for complete technical data

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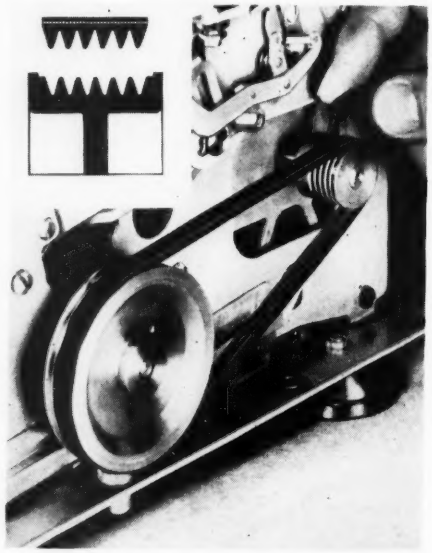
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EASTON, PA. E. ST. LOUIS, ILL. EMERYVILLE, CAL.

New Products

(Continued from page 36)



Poly-V "J" installed on office machine; inset shows cross-section of belt and sheave

recommended for high-speed application (10,000 fpm or rpm) and is flexible enough to operate easily over small sheaves with high efficiency. At present the new belt is available only to original-equipment manufacturers.

A descriptive bulletin, M142, is available from the company.

Armstrong On-and-Off the Road Tire



Armstrong Miracle S-L Tire

The Armstrong Rubber Co., West Haven, Conn., has designed a revolutionary new tire, the Armstrong Miracle S-L, which combines all the advantages of a lug-type tire with additional on-and-off the highway features. It is said to be the only tire available which has deep ridged lugs for needed traction off the road plus interlocking sipes which provide superior traction over the highway. The tire is designed especially for dumping and hauling, or any vehicle that requires on-and-off the highway service.

Equal-length shoulder bars and closer circumferential positioning of cross-bars in this tire result in a wider, flatter tread, putting more rubber on the road and giving up to 35% more wear than ordinary lug tires. Ejector grooves eliminate stone holding, groove cutting, and stone bruises, the cause of many premature tire failures. Buttressed-type support for each lug gives additional strength and stability, according to Armstrong, and prevents heel-and-toe wear caused by excessive movement of lugs in ordinary tires. Three-tier sidewall design and the rugged buffing bar protect against cuts and snags; double-strength insert plies plus an extra breaker strip give more injury resistance and freedom from impact-type breaks.



Left hand selector knob regulates duration of condensate valve opening. Adjustable from 2 to 13 seconds. Right hand knob controls a time cycle interval—1 minute, 2 minutes, or continuous. Power switch is located at upper left.

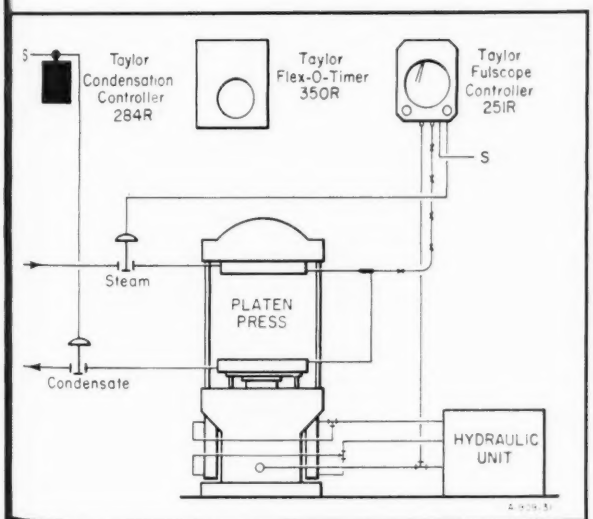
- **SIMPLE DESIGN**
- **EASY TO ADJUST**
- **MAINTENANCE FREE**

The new 284RJ Blow-Down Timer is a single function repeating cycle timer. It is designed to regulate a pneumatic control valve or other air operated device for two to thirteen seconds, once every one or two minutes. The pneumatic device may also be operated continuously.

This versatile instrument can be adapted to many applications, including removal of condensate from press platens and the operation of continuous boiler blow-down systems.

Announcing the **NEW** Taylor

BLOW-DOWN TIMER !



A typical application for the new Blow-Down Timer—maintaining uniform temperature on a Platen Press by periodic purging.

Mounted in a J.I.C. approved gasketed dirt tight case, it has a large capacity (3/16" orifice) solenoid valve capable of 90 psi operation, rigidly mounted outside the case; electrical connections are gasketed. Power supply cable enters the case through a compression grommet.

Timing is accomplished by motor driven rotary wiper arms which contact commutator bars to energize a 6-volt circuit. A relay actuates the solenoid air valve which admits air to the control valve.

All basic component parts such as the timing motor, solenoid valve, transformer, relay, etc., can be removed through plug-in socket arrangements or tapered pin plug-in terminal connections. Commutator circuits are kept clean by the continuous wiping action of the rotary contact arms. For additional insurance the commutator circuits are enclosed in plastic.

For more information call your Taylor Field Engineer, or write for Sales **Bulletin No. 98351.** Taylor Instrument Companies, Rochester, N. Y.; Toronto, Ont.

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Technology



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	1061 One of the original SBRs. This Hot type polymer is widely used for quality floor tile.	1502 This Cold type has found broad acceptance because it offers higher "physicals" than Hot types.	8200 A Cold Oil-Extended polymer permitting new floor tile economy with high quality.
DESCRIPTION			
Emulsifier	Fatty Acid	Mixed Acid	Fatty Acid
Stabilizer	Non-Staining Non-Discoloring	Non-Staining Non-Discoloring	Non-Staining Non-Discoloring
Coagulant	Salt Acid	Salt Acid	Glue Acid
Polymer			Polymer—100 pts.
Oil			NAPH—37.5 pts.
PROPERTIES			
CHEMICAL	**Specifications**	**Specifications**	**Tentative Specifications**
Volatile Matter % wt.	0.50 (Max.)	0.75 (Max.)	0.75 (Max.)
Ash % wt.	1.50 (Max.)	1.50 (Max.)	0.50 (Max.)
Organic Acid % wt.	4.00–6.25	4.75–7.00	3.90–5.70
Soap % wt.	0.75 (Max.)	0.50 (Max.)	0.50 (Max.)
Bound Styrene % wt.	22.5–24.5	22.5–24.5	22.5–24.5
Stabilizer % wt.	1.25 added	1.25 added	1.25 added*
PHYSICAL	**Specifications**	**Specifications**	**Typical Properties**
Raw Viscosity, ML-4′–212° F.	44–52	46–58	56
Cpd. Viscosity, ML-4′–212° F.	73 (Max.)	73 (Max.)	52
Tensile psi 50′	2500 (Min.)	3100 (Min.)	2550
Elongation % 50′	500 (Min.)	575 (Min.)	520
Modulus psi 25′	325–625	350–650	700
Modulus psi 50′	750–1100	775–1125	1100
Modulus psi 100′	1200–1600	1250–1650	1350

*Per Hundred Parts Polymer

Send today for complete technical data and cost-tested recipes for SYNPOLs 1061, 1502 and 8200.

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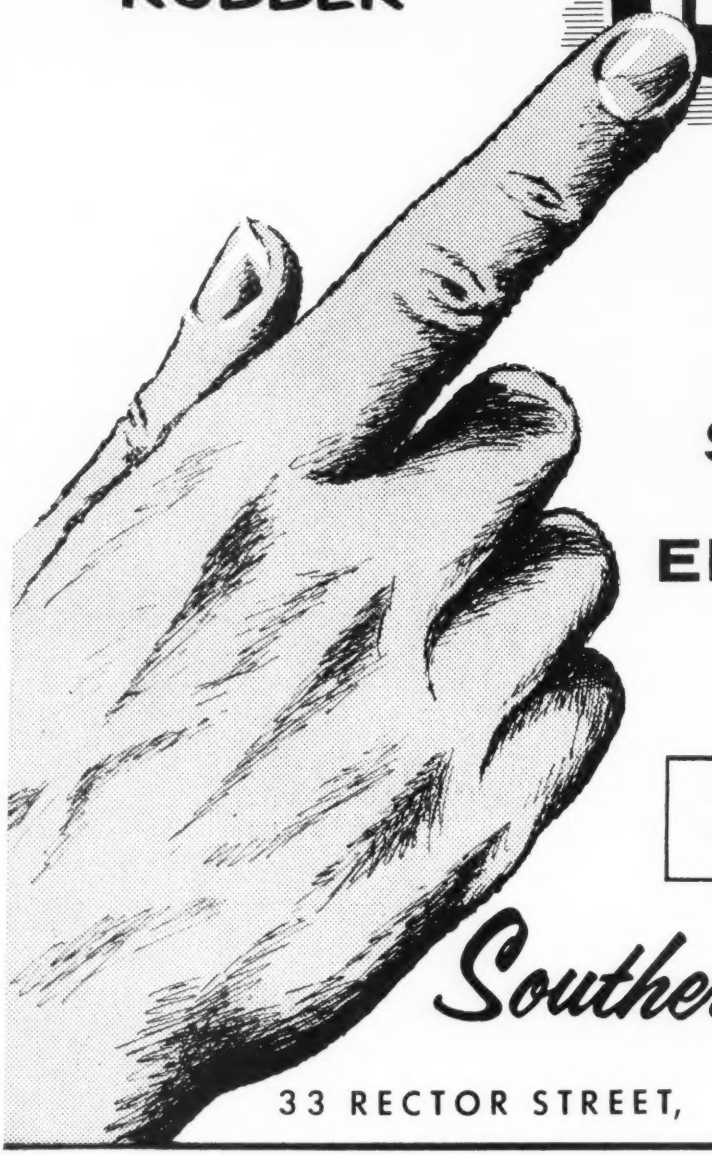
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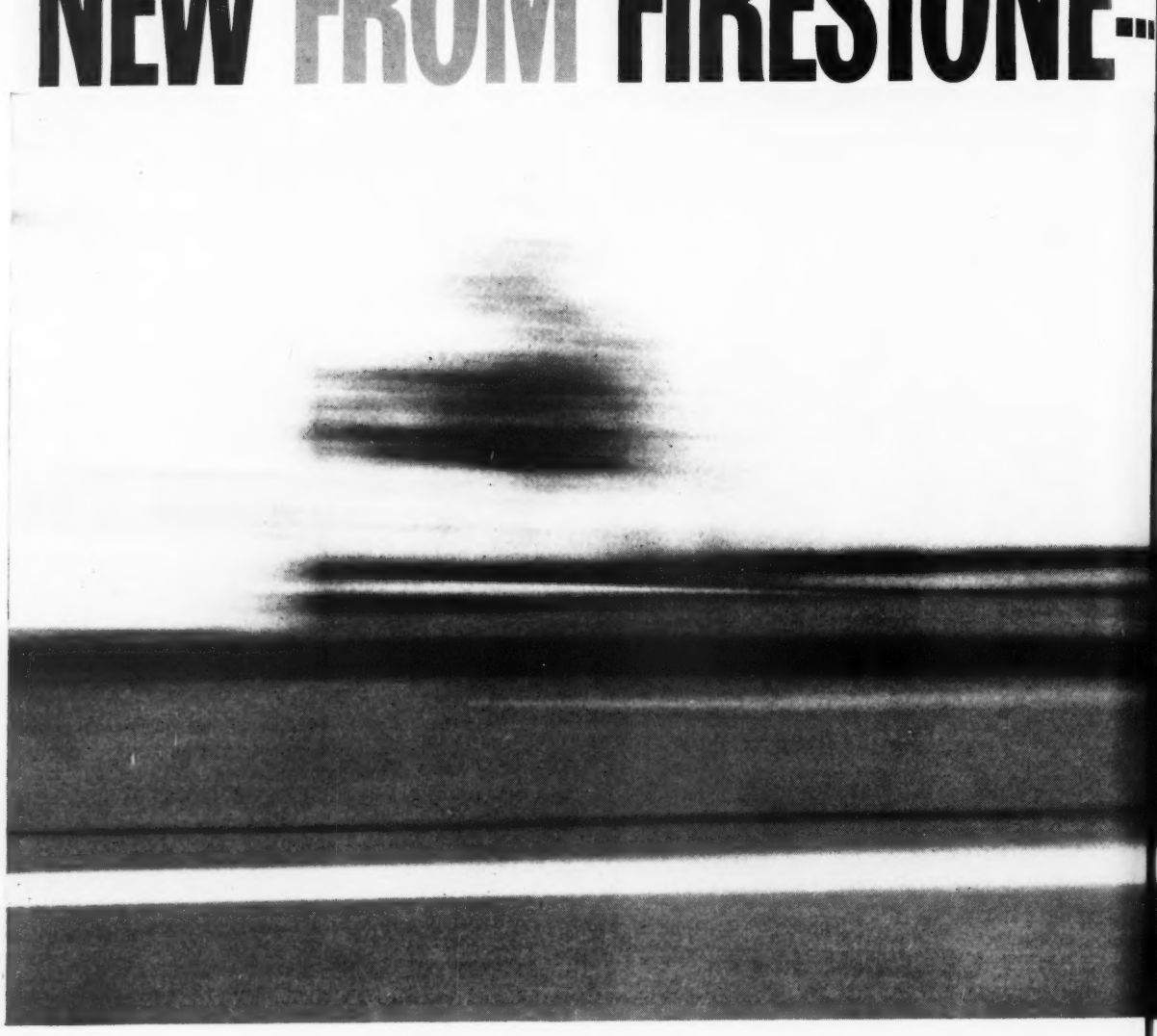
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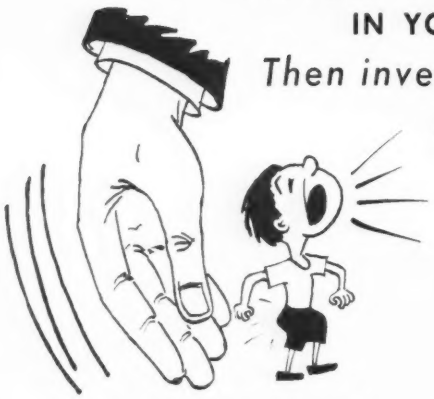
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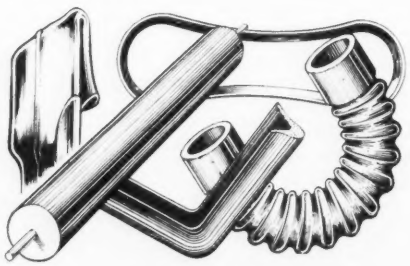
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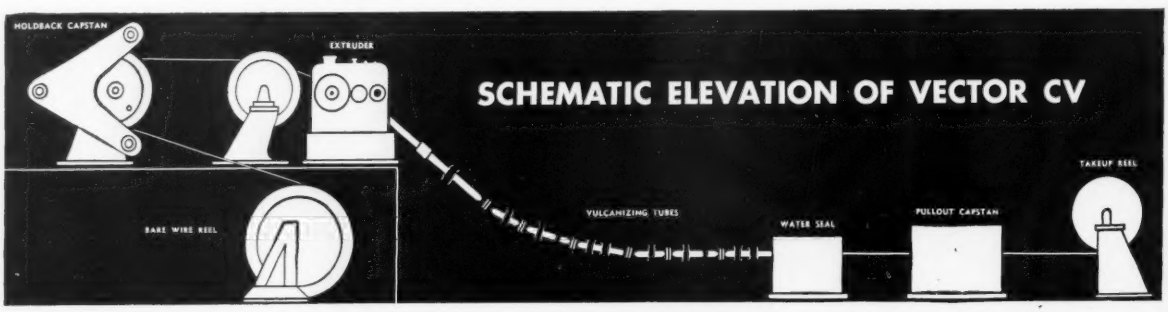
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The problems eliminated by this unique reel-less core packaging system are manifold. Loads are palletized two cores per pallet and may be stacked two or three high. This, plus the fact that you need not accumulate empty reels means storage space requirements are cut to *less than half*. You do away with all freight and handling costs on reels, the bother and expense of "bookkeeping" returnable reels, and the freezing of money in reel deposits.

This is typical of Roebling's advanced packaging methods—that makes handling Roebling high-quality wire so much easier. For details on this efficient Roebling Tire Bead Wire packaging method, or information on other types of Roebling wire, write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

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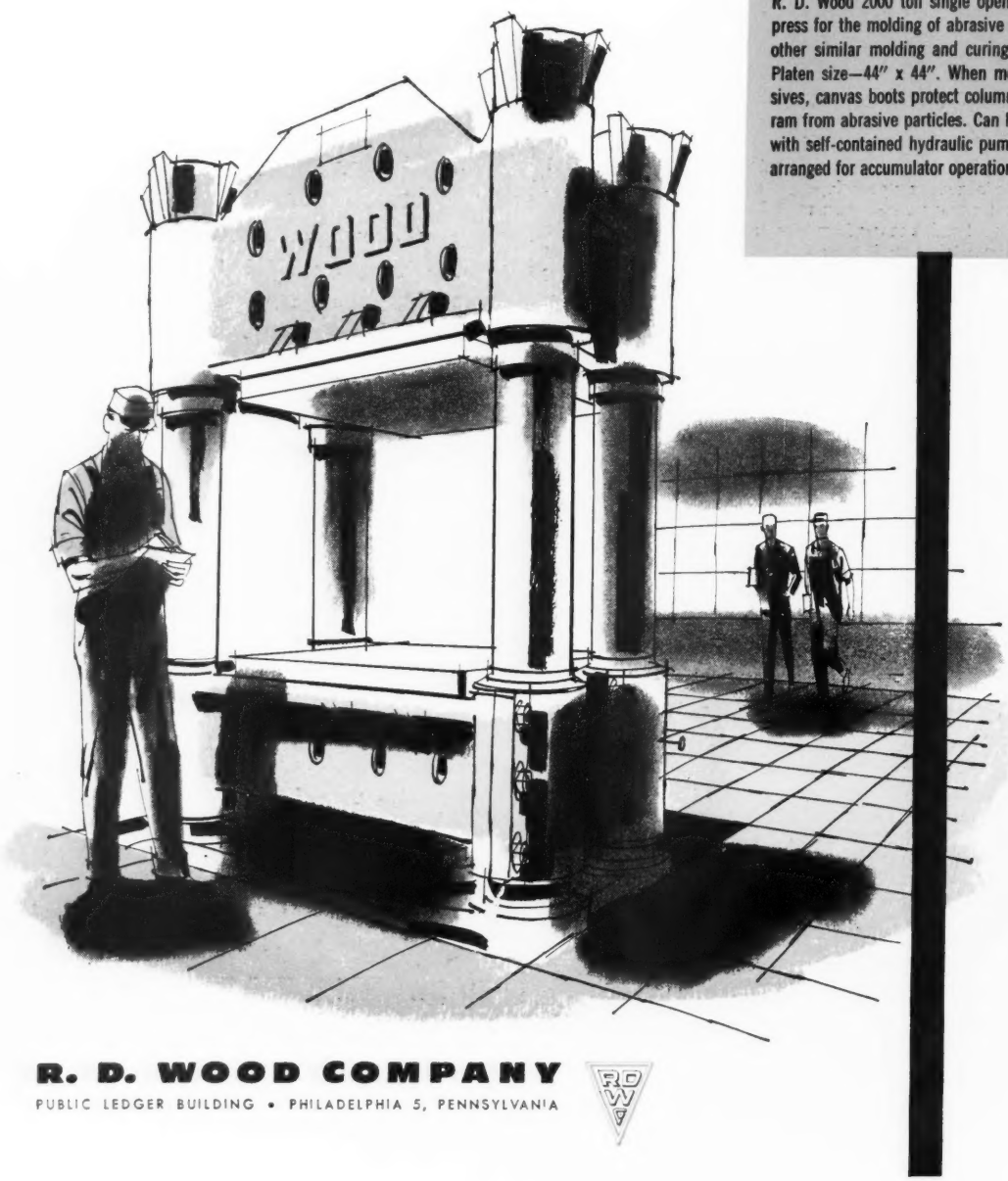
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How to save money on your next press: apply your specs to a basic R. D. Wood design

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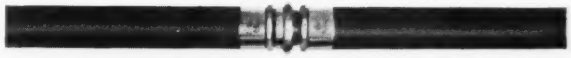
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TECHNICAL BOOKS

BOOK REVIEWS

"Rubber Red Book." 1959 Edition. Twelfth Issue. Edited by M. E. Lerner. Paper cover, 8¼ by 11¼ inches, 854 pages. Published by *Rubber Age,* New York 1, N. Y. Price $15.00.

This book, essentially a directory of the rubber industry, is published for the first time on an annual basis and is changed to a larger directory-type format. There is little change in the organization of the book from previous editions; each section, however, has been compiled from freshly secured data and represents new and up-to-date information. Fourteen additional manufacturers and 47 additional plants have been added to this edition. The coverage of the industries and its suppliers is excellent.

The book contains such sections as rubber manufacturers in the United States (and in Canada); rubber machinery and equipment; laboratory and testing equipment; rubber chemicals and compounding materials; fabrics and textiles; natural rubber and miscellaneous gums; synthetic rubber; reclaimed rubber; scrap rubber and plastics; latex and related materials; miscellaneous products and services. Other sections include consultants; sales offices, export agents; educational courses; trade and technical organizations; trade journals; and a rubber industry's Who's Who.

The book is recommended for most technologists, purchasing agents, and sales organizations to the rubber industry.

"Processing of Thermoplastic Materials." Edited by Ernest C. Bernhardt. Cloth, 6¼ by 9¼ inches, 690 pages. Reinhold Publishing Corp. New York, N. Y. 1959. Price $18.00.

This book is another in the plastics engineering series sponsored by the Society of Plastics Engineers, Inc., New York. The volume covers the processing of plastics such as the acrylic resins, cellulosic resins, nylon, polyethylene, styrene, and vinyl.

With about 20 contributors who have had considerable experience in their fields the 10 chapters cover very well the processing of these plastics. In the first three chapters, which deal with fundamentals, the subjects covered are: (1) flow behavior of thermoplastics, (2) heat transfer and thermodynamics, (3) mixing and dispersion. Section II, the major portion of the book, is concerned with applications and covers (4) extrusion, (5) injection molding, (6) calendering, (7) mixing and dispersing processes, (8) sheet forming, (9) forming of hollow articles, and (10) sealing and welding of thermoplastics. A final section, III, in the book contains processing properties for many plastics listed by type and trade name.

The book was written with the idea of presenting the latest information to engineers using plastics, but does not require that the reader possess previous knowledge in plastics processing technology. It fills a need of a basic textbook on processing of thermoplastics and should appeal to students as well as both beginning and experienced engineers.

"Punched Cards—Their Application to Science and Industry." Second Edition. Editors, Robert S. Casey, James W. Perry, Allen Kent, and Madeline Berry. Cloth, 6¼ by 9¼ inches, 697 pages. Reinhold Publishing Corp., New York, N. Y. 1958. Price $15.00.

This book is suggested to anyone dealing with large masses of data. Since much of the information covers the findings, arranging, use, storage, and methods of retrieving data, it can be applied to any system such as simple collection of data in notebooks, correspondence files, and plain cards as well as punched cards and electronic computers.



MORE PROOF OF MORE TIRE POWER

In 16 million miles of New York City taxi driving, tires with TYREX viscose cord had 26% less failures than nylon.

Tested on New York City taxi fleets, tires with TYREX viscose cord took the beating of big city driving 24 hours a day, 7 days a week. So did nylon—but not for long.

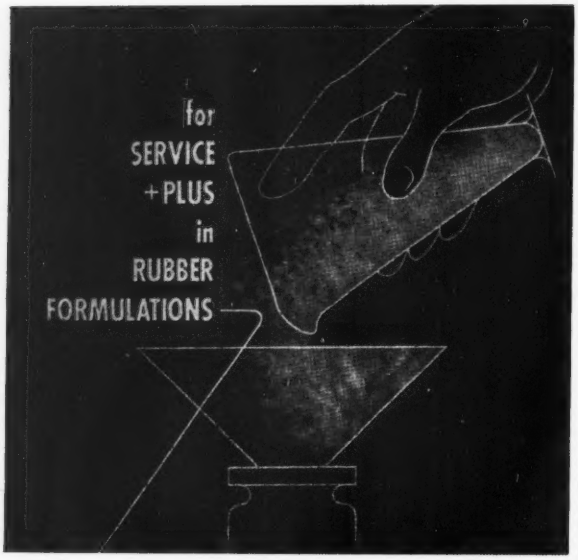
ROUGH TIME FOR TREADS
In the stop-and-go driving of New York City traffic, excessive braking nearly skinned these tires alive. So did jet take-offs and squealing turns. Still and all, tires with TYREX viscose cord proved considerably more durable in the long run than those made with nylon.

REPEATED IMPACTS PART OF DAILY GRIND
In this round-the-clock torture test, tires took plenty of brutal abuse from curbs, pot holes, railroad crossings, streets under repair. Here too, tires with TYREX viscose cord showed greater strength with 26% less failures than nylon per million tire miles.

GROWTH GETS THE ACID TEST
Every tire was under fire in this grueling marathon of taxi driving. Temperatures and pressures built to a peak. But tires with TYREX viscose cord proved superior here too, with substantially less growth than nylon—and no morning thump!

IMPORTANT NOTE ABOUT TEST CONDITIONS: *All tires used in this test were of identical construction and equal carcass strength—the only difference being in the tire cord used.*

*TYREX INC., EMPIRE STATE BLDG., NEW YORK 1, N. Y. *TYREX is a certification mark of Tyrex Inc., for viscose tire cord and yarn. TYREX viscose tire cord and yarn is also produced and available in Canada.*



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Technical Books

The various chapters are written by specialists with years of experience and cover such subjects as elementary manipulation of hand-sorted punched cards, commercially available equipment and supplies, methods for searching literature, aids to qualitative chemical analysis, as well as case histories and methods for use of punched cards in almost any-type application.

NEW PUBLICATIONS

"Fast-Curing Butyl Systems." Bulletin No. 9. Enjay Co., Inc., New York, N. Y. 4 pages. This bulletin reports a recent study which shows that by use of certain ultra-accelerators, cure times of butyl rubber can be substantially reduced while retaining good scorch characteristics and excellent resistance to degradation by dynamic flexing. Formulations and test results are given.

"Silicone Rubber for Lead Wire Insulation." CDS-179. Silicone products department, General Electric Co., Waterford, N. Y. 4 pages. This bulletin illustrates how silicone rubber offers long-term service life for lead wire insulation by maintaining excellent insulating properties for prolonged operating periods and over a wide range of temperatures. It offers a comparison among silicone rubber, polyvinyl chloride, neoprene and natural rubber, as insulating materials. Included in the comparison are maximum operating temperatures, physical and electrical properties and degrees of chemical resistance.

Publications of new products department, Linde Co., a division of Union Carbide Corp., New York, N. Y.:

"Latent Secondary Accelerator in Organic Rubber." Bulletin F-1186 B. 3 pages. This data sheet describes the chemical composition, specifications, compounding data, and results of chemical-loaded Molecular Sieve CW-1115. CW-1115, chemically di-n-butylamine adsorbed on Molecular Sieve, is recommended for use as a secondary accelerator with thiazole-type primary accelerators.

"Latent Curing Agent for Rubbers and Plastics." Bulletin F-1187 A. 12 pages. This data sheet gives detailed information on the use of CW-2015 Molecular Sieve as a curing agent in organic and silicone rubber compounds and in thermosetting resins. CW-2015 is di-tertiary butyl peroxide adsorbed on Molecular Sieve Type 13 X. In organic rubber formulations, CW-2015 functions as a non-sulfur curing agent. In vinyl containing silicone rubber compounds, CW-2015 is a superior catalyst. In peroxide catalyzed thermosetting resins, CW-2015 gives extended pot life at ambient temperatures.

"Latent Accelerator for Neoprene." Bulletin F-1189 A. 7 pages. This data sheet describes the use of CW-3120, 1,3 dethyl thiourea adsorbed on Molecular Sieve Type 13X, as an accelerator in curing the following stocks: Neoprene W—hard clay; Neoprene W—hard clay, oil; Neoprene W—whiting; Neoprene W—black; Neoprene G—black; and Neoprene G—clay.

"Linde Molecular Sieve Type 4A Activated Powder." Bulletin F-1190 A. 6 pages. Molecular Sieve Type 4A Activated Powder, sodium alumino silicate, is recommended as a scavenger for residual water in both rubber and plastics formulations.

"Latent Curing Aids in Rubber and Plastics." Bulletin F-1194 A. 12 pages. This bulletin gives general information on the types and the uses of Linde Molecular Sieves as curing aids in rubber and plastics.

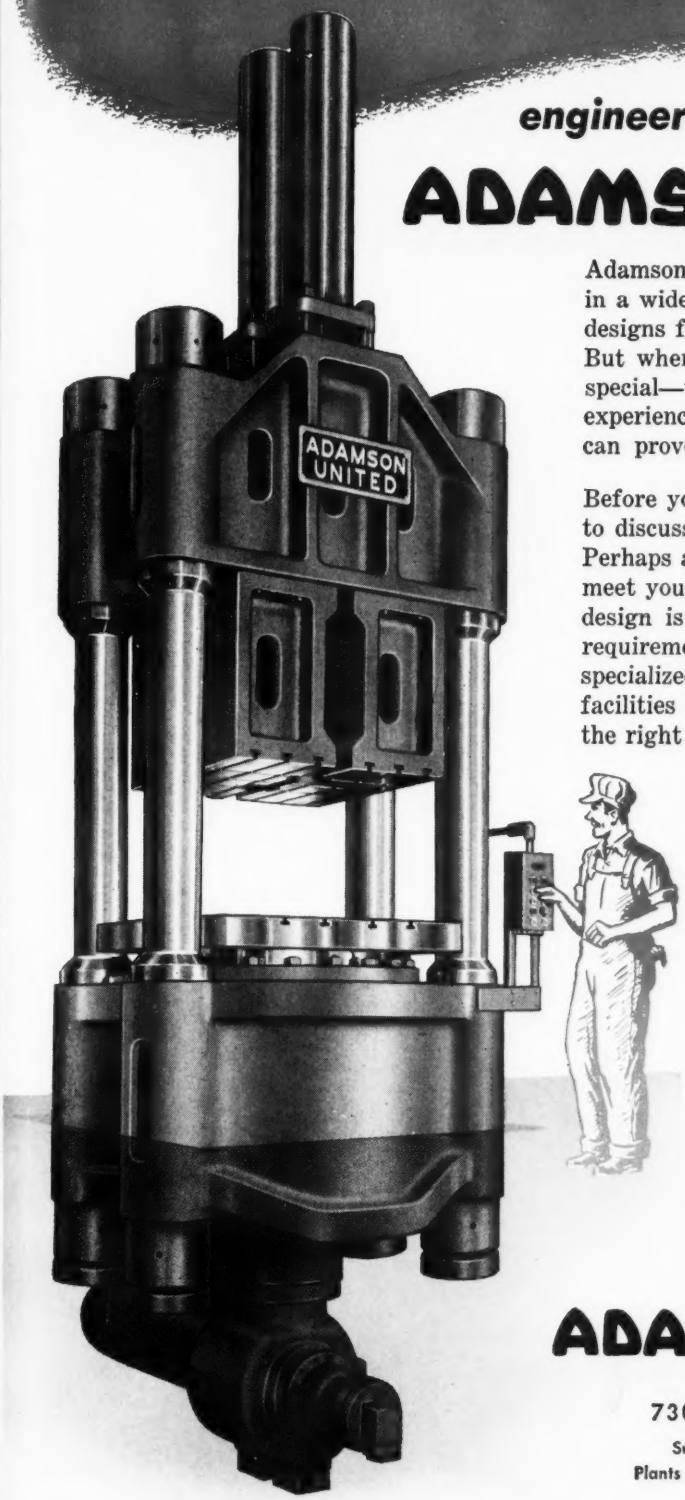
"CW-3120 as Accelerator in Neoprene Formulations Containing Low Concentrations of Metallic Oxides." Bulletin F-1288. 4 pages. This sheet describes the use of Molecular Sieve CW-3120 (diethyl thiourea-loaded Molecular Sieve) as accelerators which permits the reduction of zinc and magnesium oxides in various neoprene formulations. Results appear in tabular form.

"Latent Accelerator for Resin-Cured Butyl Rubber." Bulletin F-1309. 12 pages. Linde Chemical-Loaded Molecular Sieve CW-3615 is recommended for use as an accelerator for the resin cure of butyl rubber. CW-3615 may be used alone or in combination with zinc oxide and halogenated elastomers. Typical recipes, compounding data, and test results are presented.

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This 2000-ton self-contained transfer molding press is an excellent example of our custom engineering service. Built by Adamson for Orangeburg Manufacturing Company, Inc., this unit is specially designed to produce large molded pipe fittings. Unusually compact, it occupies minimum floor area. Platen size is 54" x 52". A unique system of valving and pumping provides exceptional versatility, permits precision control over a broad range of speeds and pressures.

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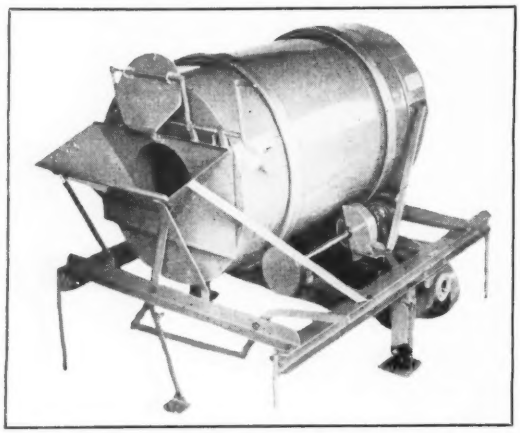
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Technical Books

"Pennsalt Rubber Chemicals." S-156. Industrial chemicals division, Pennsalt Chemicals Corp., Philadelphia, Pa. 40 pages. This revised catalog is broken down into five main sections; chemicals for the dry rubber compounder; chemicals for the latex compounder; other chemicals for the rubber industry; handling rubber chemicals; and accelerator compounding. Besides detailed property specifications of the chemicals, a discussion on accelerator compounding is presented. A glossary of accelerator compounding terms also is included.

"Bureau of Ships Rubber Formulary. Revision Five." Bureau of Ships, Department of the Navy, Washington, D. C. Many new formulations have been added, and all formulations have been brought up to date in this revised formulary. Formulations and test data have been compiled by the rubber laboratory, Mare Island Naval Shipyard, for the assistance of rubber manufacturers in the fabrication of products for naval use. The formulary is supplied in looseleaf form to allow for revisions caused by modifications to the specifications, or the addition of new formulations. The formulary is divided into such sections as index, ingredients, suppliers, military specifications, federal specifications, and miscellaneous specifications.

"AviSun Polypropylene." AviSun Corp., Philadelphia, Pa. 4 pages. This preliminary technical data sheet lists the physical properties of AviSun polypropylene and describes general recommendations for the use of the new thermoplastic in injection molding, extrusion, film, fiber, and other applications. The plastic, the lightest commercial plastic available, is reported to have outstanding properties of tensile strength, temperature resistance, and stress cracking resistance.

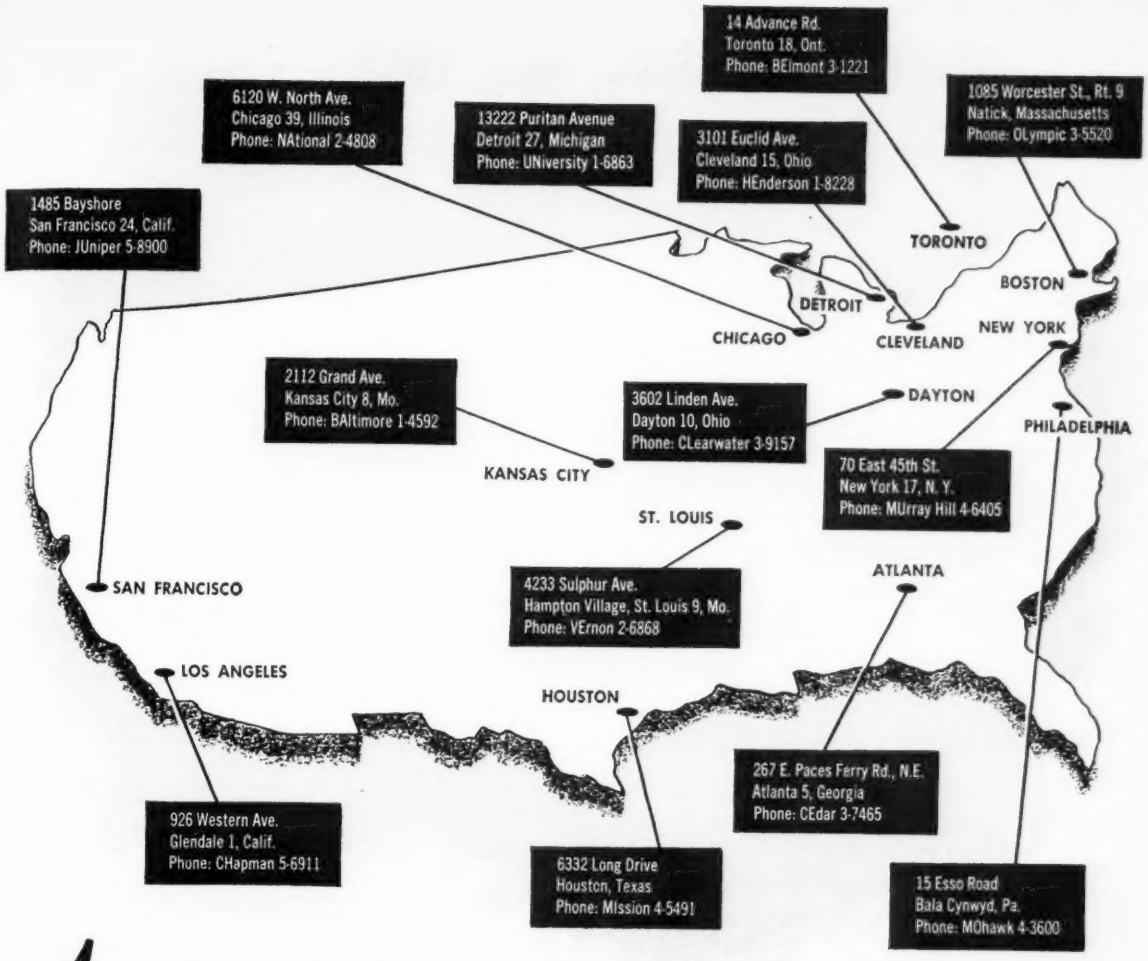
"Hycar Latex Newsletter. Issue No. 18." B. F. Goodrich Chemical Co., Cleveland, O. 12 pages. This newsletter describes the general properties of Hycar nitrile, acrylic acid ester, and styrene resin-type latices and contains general and specific compounding information. The sections cover an introduction, thickening agents, binding mineral pigments, and thickening nonionic latices. Tables are provided.

Publications of the British Rubber Producers' Research Association, Welwyn Garden City, Herts, England.

No. 279. **"Graft Interpolymers Formed by (γ)—Irradiation of Methyl Methacrylate-Natural Rubber Mixtures."** By D. J. Angier and D. T. Turner. 10 pages. On exposure to Co-60-γ-radiation, mixtures of natural rubber and methyl methacrylate yield almost exclusively rubber-polymethyl methacrylate graft polymers. An appreciable amount of free polymethyl methacrylate is formed only in the presence of a transfer agent or following radiation-induced degradation of the interpolymer. The influence of the purity of the rubber, monomer concentration, field intensity, the pressure of transfer agent, and the gel effect on the rate of formation, yield, and structure of the interpolymer are reported.

No. 284. **"Graft Polymerization in Rubber Latex by γ-Irradiation."** By E. G. Cockbain, T. D. Pendle, and D. T. Turner. 1 page. When methyl methacrylate is added to natural latex, the methacrylate is imbibed by the rubber particles and in the presence of suitable catalysts can be polymerized so that part of it combines chemically to form a graft polymer. The resulting graft polymers have been called MG rubbers. Similar polymerizations effected by γ-irradiation from a Cobalt-60 source are reported in this study; the resulting polymers are designated MGI rubbers. The colloidal and film-forming properties of MGI rubber latices show striking differences from those of equivalent MG rubbers.

No. 293. **"Dynamic Properties of Resilient Materials: Constitutive Equations."** By J. E. Adkins. 24 pages. Constitutive equations are formulated for a class of resilient materials for which the stress distribution at any instant is assumed to depend both upon the deformation and upon the time rates of variation of the tensors defining it. Particular attention is given to aeolotropic bodies.



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No. 283. **"Rupture Propagation in Inhomogeneous Solids: An Electron Microscope Study of Rubber Containing Colloidal Carbon Black."** By E. H. Andrews and A. Walsh. 10 pages. Replica electron microscopy of ruptured surfaces has been used to study the rupture process in solid two-phase systems obtained by dispersing colloidal carbon in rubber. The results, together with a correlation found between adhesion and tearing energy, may be largely explained in terms of the local concentrations of stress which occur at the particles of the dispersed phase.

No. 285. **"Catalytic Hydrogenation of Unsaturated Sulfides and Sulfones."** By L. Bateman and F. W. Shipley. 2 pages. By means of palladium on charcoal or barium sulfate, thiophen and certain of its derivatives have been reduced at room temperature at 20-25 psi, and the same catalyst (on charcoal) has been used for the reduction of 1-methylallyl phenyl sulfide and allyl and phenyl propenyl sulfide at room temperature and pressure. For a range of sulfides and sulfones various generalizations were made.

No. 287. **"The Reaction of Sulfur and Sulfur Compounds with Olefinic Substances.** Part VIII. The Reaction of Sulfur with Mono-Olefins." By L. Bateman *et al.* 9 pages. Reaction of sulfur with mono-olefins at 140° C. gives not only alkenyl alkyl polysulfides as previously supposed, but also substantial amounts of more saturated compounds having two attachments of sulfur per olefin moiety. The proportion of alkenyl alkyl polysulfide to these other products varies in a regular manner among the different types of olefin.

No. 288. **"The Reaction of Sulfur and Sulfur Compounds with Olefinic Substances.** Part IX. The Reaction of Sulfur with 2:6-Dimethylocta-2:6-diene." By L. Bateman *et al.* 10 pages. Reaction of 2:6-dimethylocta-2:6-diene with sulfur at 140° C. yields 2:6-dimethylocta-2:4:6-triene, the cyclic monosulfides and a cross-linked polysulfide fraction containing two diene (C_{10}) units joined by one or two sulfur cross-links. The compositions of the cyclic sulfide and cross-linked polysulfide fractions and their variation with time of reaction have been determined. Results and conclusions have been reached and are presented.

No. 289. **"The Reaction of Sulfur and Sulfur Compounds with Olefinic Substances.** Part X. The Kinetics of the Reaction of Sulphur with Cyclohexene and Other Olefins," By G. W. Ross. 10 pages. The interaction of sulfur and cyclohexene at 110-140° C. has been studied dilatometrically. The reaction is autocatalytic, and in the early stages the rate is proportional to the square root of the sulfur, olefin and product concentrations. The kinetic and product data are consistent with a polar, not a free-radical chain reaction.

"Paper Roll Mills." Catalog No. 9700. B. F. Goodrich Industrial Products Co., Akron, O.

"Hooker Chemicals." No. 100-C. Hooker Chemical Corp., Niagara Falls, N. Y.

"Piccoflex." Bulletin No. P-12-91-1-5-59. Harwick Standard Chemical Co., Akron, O. 1 page.

"Harflex 330 Polyester Type Plasticizer." Harchem division, Wallace & Tiernan Inc., Belleville, N. J. 6 pages.

"S-1509," "SP-103," "S-Polymers in Microcellular Sponge Soling." Shell Chemical Corp., Torrance, Calif.

"Philblack Specifications." Phillips Chemical Co., Akron, O. 1 page.

"ASRC-1712," "ASRC-1713," "ASRC-3106." Description and specification sheets. American Synthetic Rubber Corp., New York, N. Y.

"Summary of Silicone Rubber Specifications." CDS-188. Silicone products department, General Electric Co., Waterford, N. Y. 8 pages.

"Chromalox Electric Process Heaters." Catalog 60. Edwin L. Wiegand Co., Pittsburgh, Pa.

"Cleveland Speed Variator." Bulletin No. K-250. The Cleveland Worm & Gear Co., Speed Variator Division, Cleveland, O.

"Sliding Gate Diaphragm Control Valves." Bulletin J-170. OPW-Jordan, Cincinnati, O.

"Armour Aliphatic Organic Chemicals." Armour Industrial Chemical Co., Chicago, Ill. 10 pages.

"Imidazoles." Houdry Process Corp., Philadelphia, Pa.

"Index of Technical Literature." Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn. 22 pages.

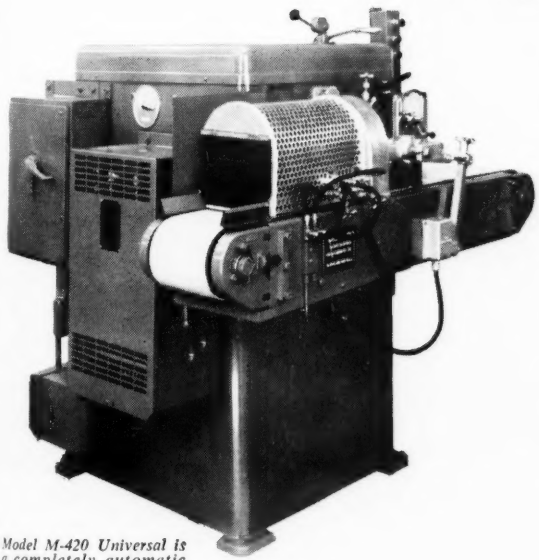




Typical rubber part molded from preps cut automatically by Wink Cutter at Monarch Rubber Co., Hartsville, Ohio.

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Monarch Rubber Company automates cutting of mold preps; eliminates double handling; speeds operations



Model M-420 Universal is a completely automatic machine for both continuous and intermittent cutting. Pays off on short or big runs. The built-in metering conveyor elements transport the uncut stock to the knives, precisely measure the length of cut and move the cut stock away from the blades. Wink actually measures while it cuts from four points simultaneously. It does not depend upon timing or synchronization with another unit or machine—does not cut against a dead element but against another live knife.

New—Large cutter handles up to 6-inch diameters. Write for information.

"The Wink Cutter has really paid off for us in cutting mold preps", reports Monarch Rubber Company, producers of a wide range of molded rubber products. "By automatically cutting mold preps right at the extruder, at rates up to 1500 pieces a minute, we're saving 50 manhours a day." In this operation, the extruded material was formerly cut into long strips, transported to a guillotine cutter, unloaded, and cut at much slower rates.

Accuracy of the Wink Cutter also saves money for Monarch. The Wink unit cuts each piece within a fraction of an ounce. By holding weight of each piece so closely, flashing in the mold is reduced, minimizing waste material. "It's the most accurate machine we've run across", reports Monarch, "and this is important in big production runs."

Wink Cutters *can help you* reduce costs in cutting rubber, both raw and cured, plastics, impregnated fabrics, reinforced hose, natural and synthetic fibers, ceramics, candy . . . even sticky or viscous materials. Write today for Bulletin W-100 . . . it lists complete engineering information. Contact Motch & Merryweather Machinery Company, Wink Cutter Division, 1250 East 222nd Street, Cleveland 17, Ohio.

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6

1

Light-Colored S-1006 is a hot, non-discoloring, non-staining, color-stable polymer which finds extensive use in light-colored, molded or extruded goods and applications where extreme whiteness and good aging resistance are demanded. The finished product reflects the whiteness of the bale.

2

Light-Colored S-1011 is a unique gel-free polymer that is used in adhesives and sealants. It is a hot rubber and is non-staining and non-discoloring . . . just the answer for white adhesive applications such as medical tape, and for various sealants which require outstanding color properties.

3

Light-Colored S-1502 is a non-discoloring and non-staining general-purpose rubber. Its exceptional balance of physical properties makes it one of the most popular COLD polymers. S-1502 offers you high strength and long wear as well as excellent original color and color stability.

good ways to whiter, brighter rubber products

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Efficient methods for producing lighter colored S-Polymers were developed by Shell's extensive research program—one of the world's largest devoted to synthetic rubber. Other advances include: improved shipping containers such as the Flotainer® package; new latices for foam goods; improved, high-dispersion black masterbatches; and an American first—synthetic polyisoprene rubber in limited tonnage quantities.

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SYNTHETIC RUBBER DIVISION, P. O. BOX 216, TORRANCE, CALIFORNIA

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4

Light-Colored S-1509 is the new low Mooney version of S-1502. S-1509 eliminates breakdown, saving processing time and the cost of peptizing agents. This rubber is ready for immediate use in chemically blown sponge and other applications that demand easy processing and good mold flow.

5

Light-Colored SP-103 is a blend of equal parts of high styrene resin and low Mooney S-1509 rubber in easy-to-handle crumb form. The resin in this masterbatch is already dispersed to save you mixing time and reduce tendency to scorch. The inclusion of S-1509 makes this blend ideally suited for blown sponge.

6

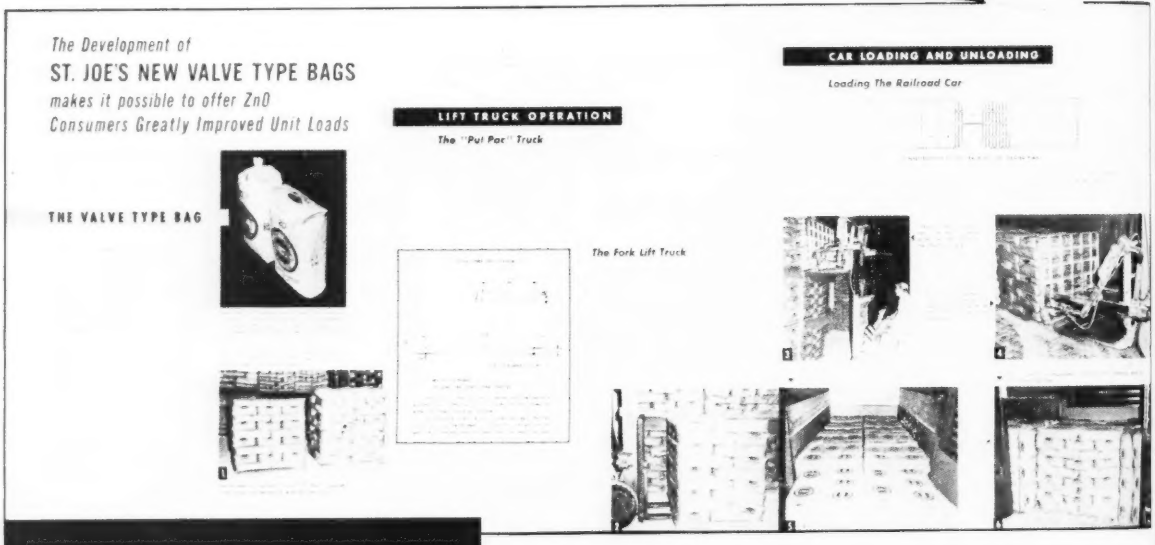
Light-Colored Oil-Extended S-1703 and S-1707 are non-discoloring and non-staining, unusually light in appearance. S-1703 contains 25 parts of light-colored oil in 100 parts of polymer; S-1707 contains 37.5 parts of oil for even greater economy. Both polymers offer cold-rubber properties at low cost.

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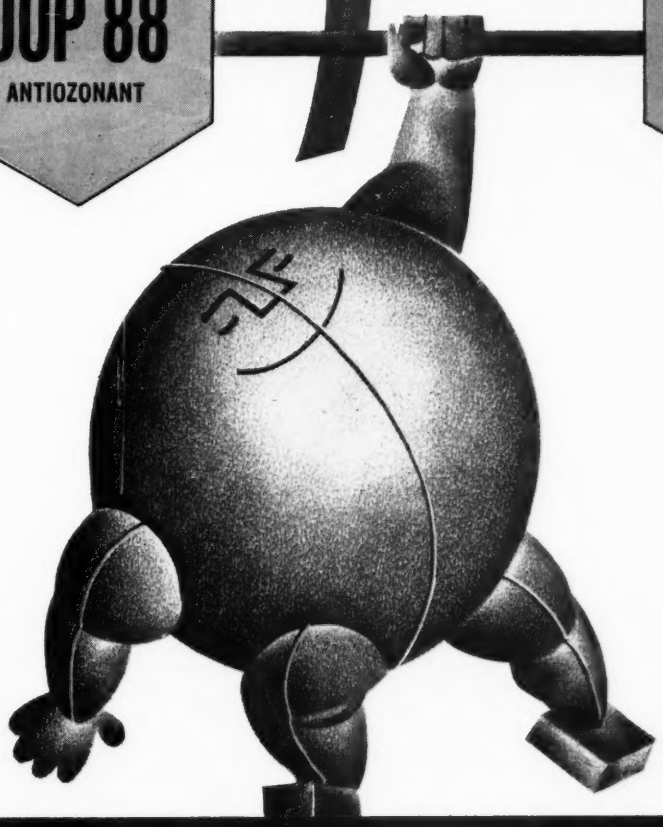
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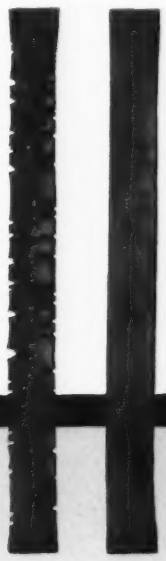
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(Right) Carbon black—HAF (high abrasion furnace), Curing system—2 phr sulfur, 2 phr benzothiazyl disulfide, No cracks in 239 hr.

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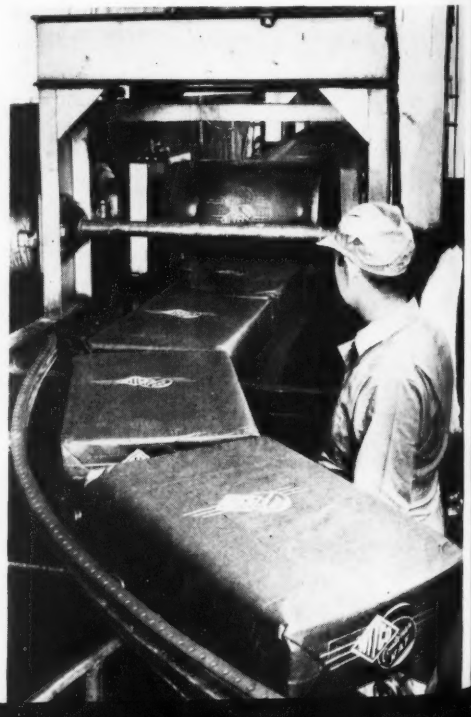
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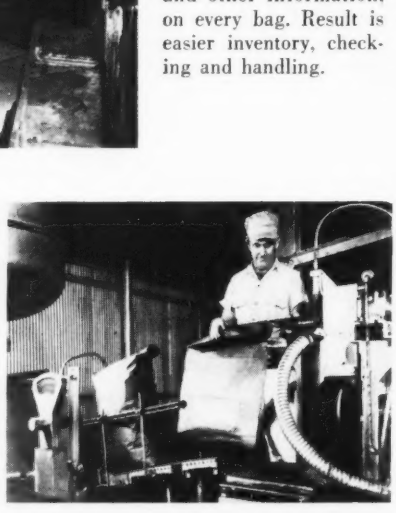


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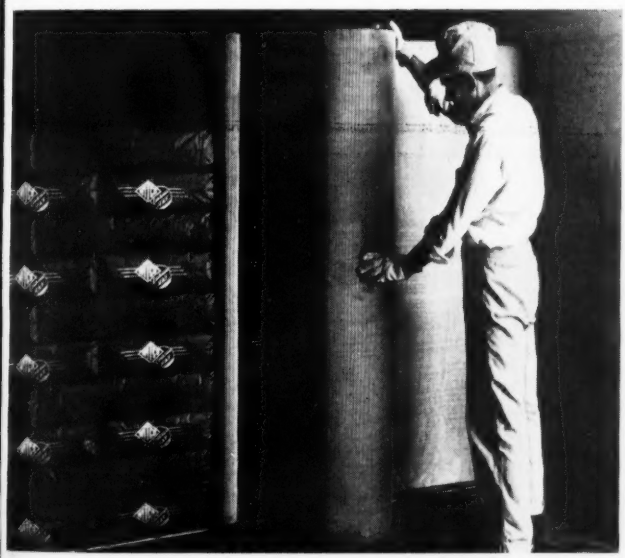
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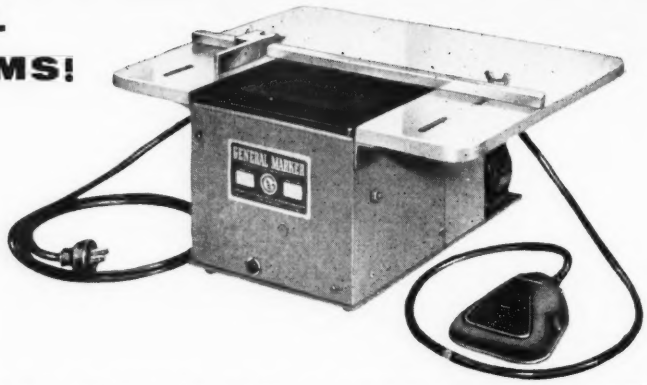
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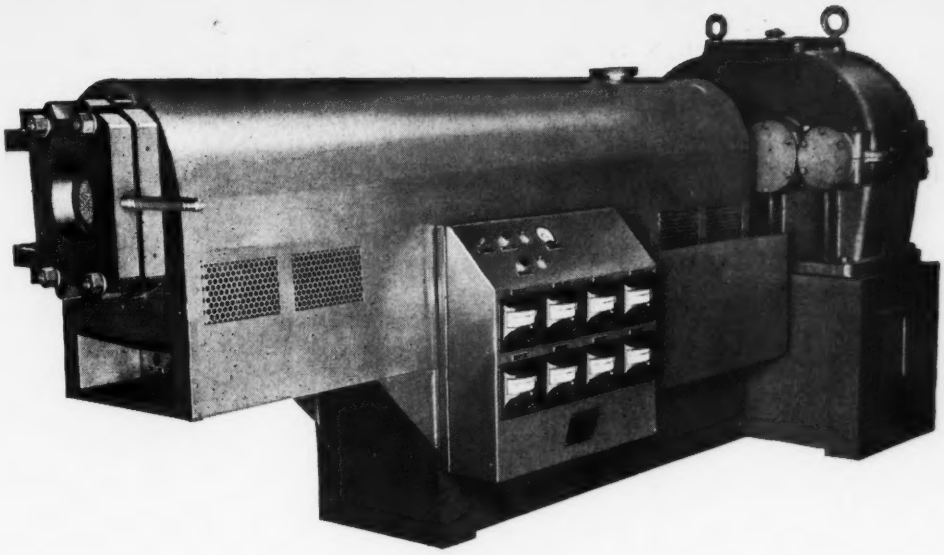
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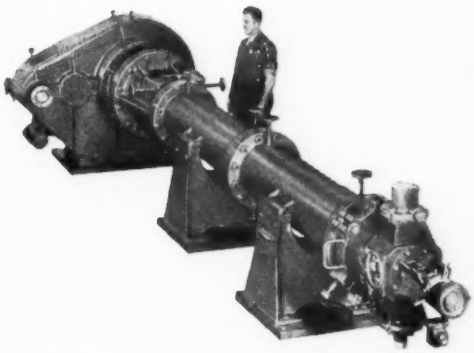
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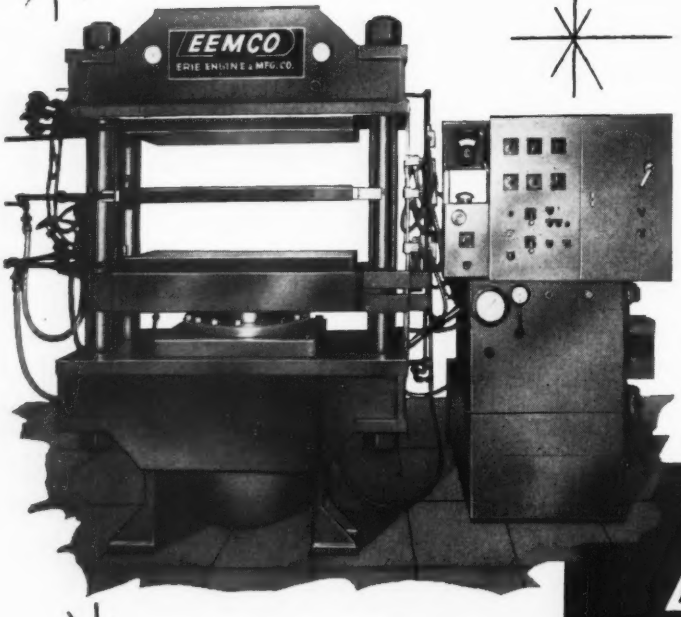
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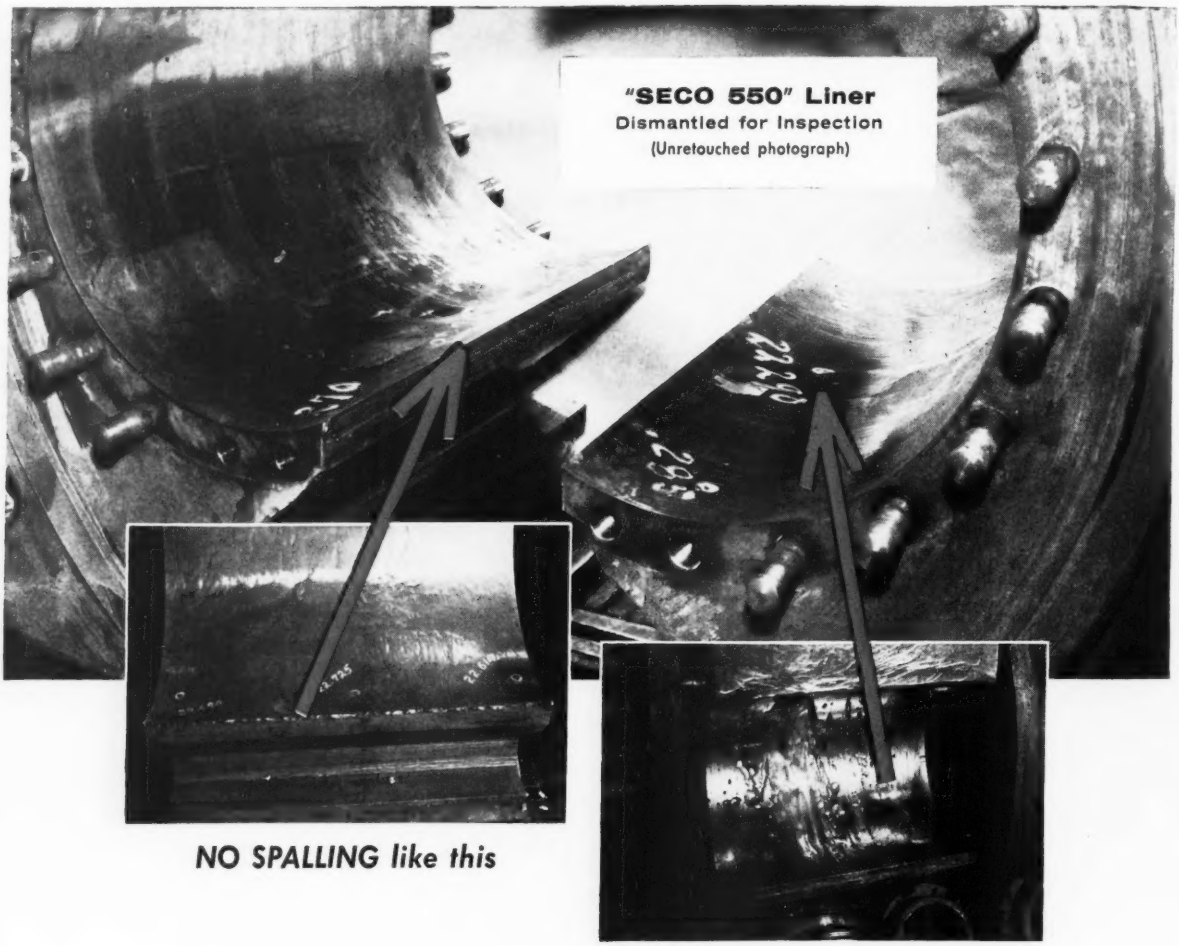
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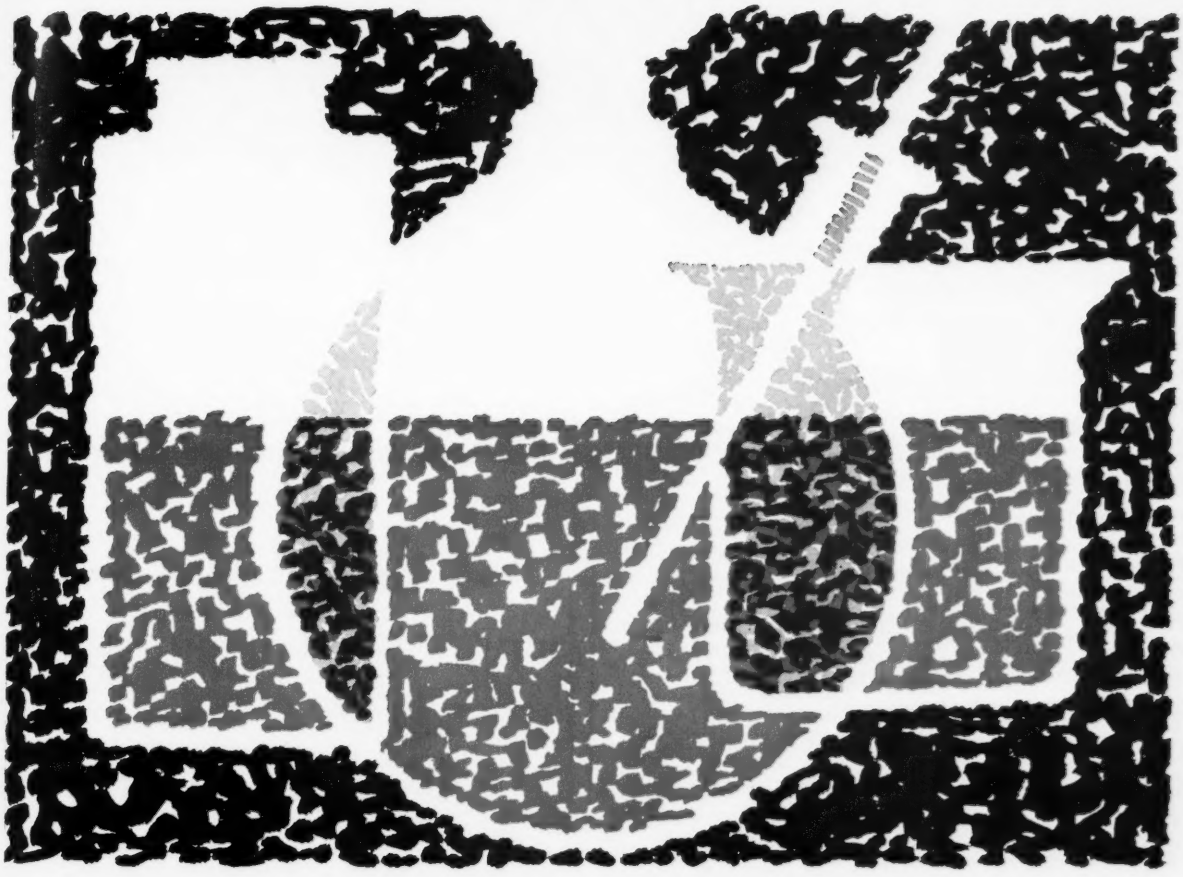
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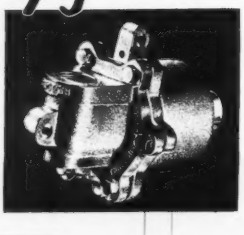
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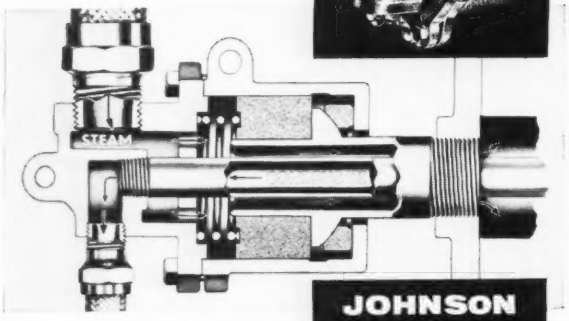
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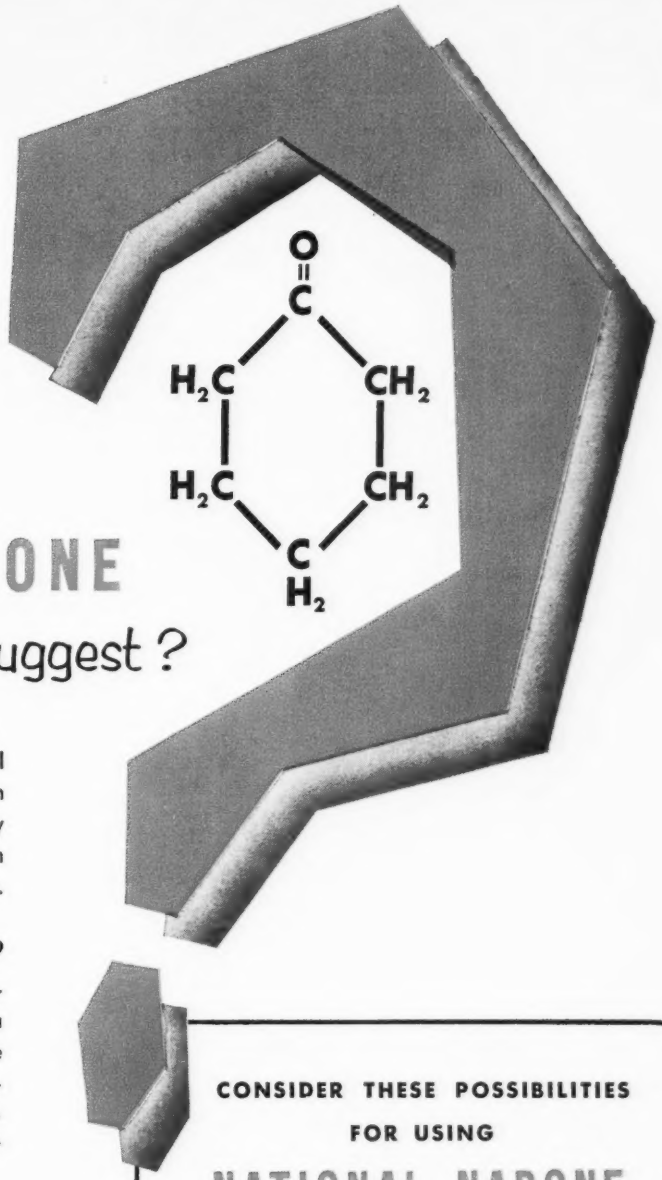
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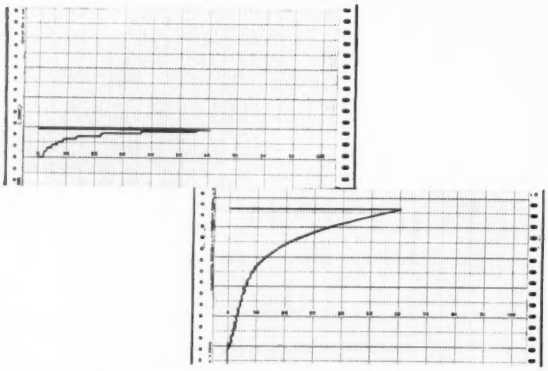
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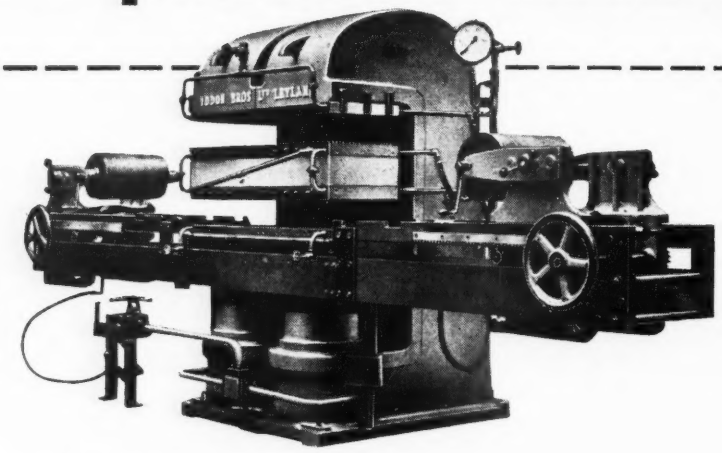
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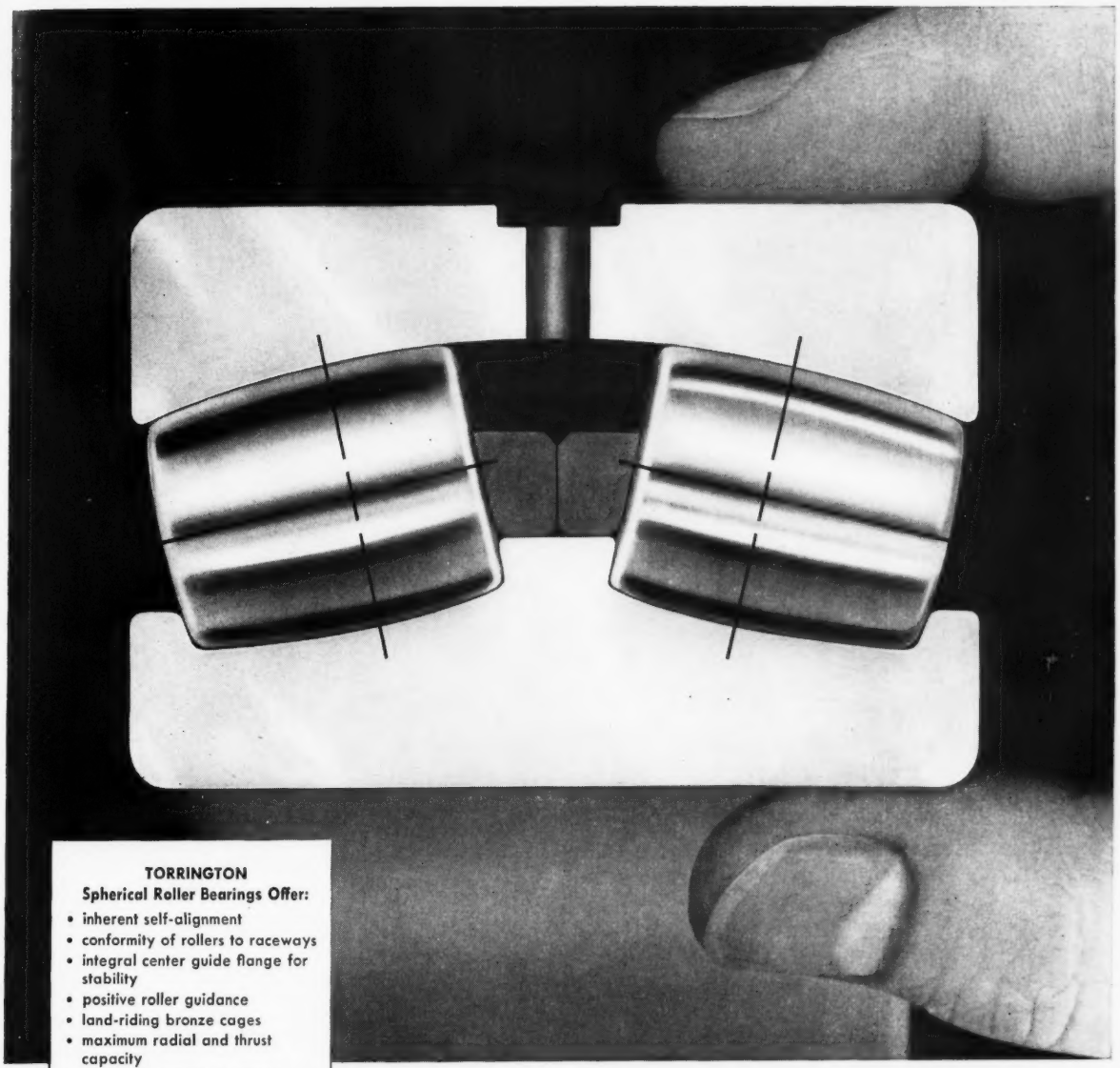
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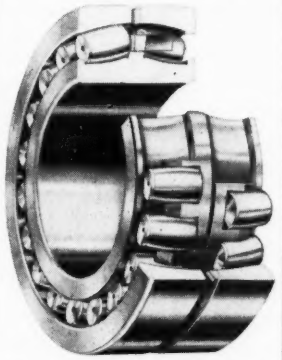
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RUBBER WORLD

EDITORIAL

1889—RUBBER WORLD'S 70 YEARS—1959

THIS October, 1959, issue of RUBBER WORLD completes 70 years of publication of America's first and oldest rubber trade journal.

The late Henry C. Pearson was founder, editor, and publisher of INDIA RUBBER WORLD from 1889 until 1926, at which time it became the property of Edward Lyman Bill, Inc., predecessor of Bill Brothers Publishing Corp., the present owner. The name was changed to RUBBER WORLD in June, 1954. The original objectives of aiding the scientific and mechanical developments of the rubber industry have been adhered to during the 70 years of publication and will remain our primary aim.

It is not possible or practical to review 70 years of developments in the rubber industry and RUBBER WORLD in this column. A good review of the first 50 years of the industry and the magazine was presented in our October, 1939, issue. Comments on developments since the beginning of World War II are considered to be of more current interest.

The great American synthetic rubber producing industry came into being during this wartime period. The demand for compounding and processing information on the new styrene-butadiene rubber, then called GR-S, was very great. We were able to provide a good amount of such material and also some on the use of GR-S in tires and industrial rubber products. Information on efforts to develop and use more rubber from the guayule shrub, either alone or in combination with synthetic rubber, was presented also. Prewar German and Russian literature on rubber and related materials was reviewed in a continuing series in order to provide every possible aid to this country's technical men during the war.

A Plastics Technology department was started in 1945 in order to provide information on the growing use of related plastic materials by the rubber industry. *Plastics Technology* became a separate Bill Brothers publication in 1955 so that all industrial users of plastics might be more adequately served.

The 1950's have been a decade of outstanding developments in the rubber industry. RUBBER WORLD has tried to keep pace with these developments as reference to some of its editorial content will show. There were articles in 1951 on oil extension of synthetic rubbers, a series of editorials and articles in 1953 on the future of synthetic rubber research, articles on antiozonants began in 1954 and have been continued periodically to date, and the status of automation in the industry was covered in 1955. Properties and applications of *cis* polyisoprene were explained in 1956; improvements in the masterbatching of carbon black in SBR in 1957; heat and radiation effects on practical rubber compounds in 1958; and available dry styrene-butadiene rubbers and some aspects of quality control in 1959, to name but a few.

We believe RUBBER WORLD can be justly proud of its 70-year history and with the industry it serves can look to the future with much anticipation, a future that will evidence an accelerating industry growth rate with which RUBBER WORLD will continue to keep pace.

R. G. Seaman

EDITOR

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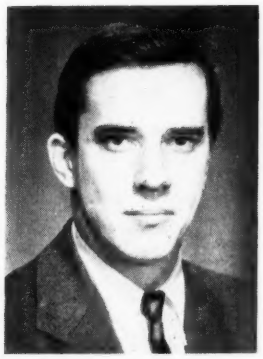
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RUBBER WORLD



Peter B. Baker

Economics of Flexible Foams—A Second Look

By PETER B. BAKER
Arthur D. Little, Inc., Cambridge, Mass.

SINCE the publication of the article, "Economics of Flexible Urethane and Latex Rubber Foams,"[1] raw-material costs for urethane foam have become significantly lower than those for foam rubber. Urethane foam slab stock is priced below foam rubber; and in many applications in which slab can be used without much fabrication, urethane products are less expensive than molded foam rubber. The purposes of this article are to examine present comparative economics and to suggest what further changes are likely.

The technology of rigid and semi-rigid foams has advanced considerably in the past year, but the stage of development of these products is still behind that of flexible foams. The rigid and semi-rigid plastic foams will compete less with rubber than with insulating materials such as fibrous glass and cork.

This article deals primarily with urethane and rubber foams, because they are highly developed technically and commercially. Flexible vinyl foam has not become as important, partly because urethane foam was introduced at about the same time and appeared to have more potential, and partly because of the unfavorable properties, such as high compression set of the former.

The major improvement in urethane properties and economics, which began three years ago with the development of polyether-based foams, continued during the past year. Raw-material costs were lowered, and the one-shot process for making polyether-based foam was developed.[2] Formerly, polyether-based urethane had to be made from a prepolymer; the result was an extra processing step and more difficult handling in the foaming reaction.

The one-shot polyether system was made possible by the development of improved catalysts and foam stabilizers. One-shot polyether foam can be uniformly manufactured at lower densities than the prepolymer-based material, and it is said to be more stable and uniform. The one-shot polyether process has increased the possibility of molding urethane foam in closed molds;[3,4] the foaming mixture has a lower viscosity than the prepolymer-based mixture and therefore flows and spreads more uniformly throughout a mold. Because of the greater reactivity of the mixture, mold-release problems are aggravated, but release agents can probably be found, as they were for the prepolymer molding systems.

Changes in the foam rubber process[5] over the past year have been less spectacular than those in urethane, and this situation can be expected to continue. Foam rubber is an older product with a more mature technology. There is a continuing trend toward the use of lower-cost and more stably priced synthetic rather than natural latex and toward increased use of inorganic loaders to reduce cost. There is no prospect, however, either in product or in technology, of dramatic changes such as are expected to continue in urethane.

Foam Properties

Flexible foams are primarily used for their cushioning properties. A meaningful comparison of flexible foams must therefore be based on their cushioning value and their ability to retain this value over their period of use. The cushioning value of a material is determined largely by its load-deflection curve, and useful life by its aging and compression-set properties. Test procedures and standards for these and other properties have been established for foam rubber by

[1] P. B. Baker, RUBBER WORLD, Aug., 1958, p. 733.
[2] *Chem. Eng. News*, Dec. 1, 1958, p. 48.
[3] R. E. Knox, RUBBER WORLD, Feb., 1959, p. 685.
[4] R. E. Knox, W. J. Touhey, *Ibid.*, Aug., 1959, p. 711.
[5] T. H. Rogers, K. C. Hecker, *Ibid.*, Dec., 1958, p. 387.

TABLE 1. FLEXIBLE URETHANE FOAM MATERIAL COSTS

Formulation

	Parts by Wt.	% by Wt.	$/Lb.
Polyether resin: Diol @ 22¢/lb. / Triol @ 23½¢/lb.	100	72.1	0.166
TDI @ 75¢/lb.	35	25.3	0.190
DABCO* @ $10/lb.	0.2	0.13	0.013
Organotin @ $2/lb.	0.1	0.07	0.001
Water	2.9	2.1	—
Silicone oil @ $3/lb.	0.4	0.3	0.009
	138.6	100%	0.379

Losses	Open Molded Slab	Closed Molded
Inventory and preparation	2%	3%
Gas	6%	7%
Defective product	10%	10%
	18%	20%
Cost per lb. before trim	$0.462	$0.474
Trim	27%	0

Material Cost per Lb. of Salable Product

	$0.633			$0.474	
Compression (RMA) Lbs. @ 25% Defl.	Density (pcf)	Cost Bd. Ft. ($)	Compression (RMA) Lbs. @ 25% Defl.	Density (pcf)	Cost Bd. Ft. ($)
18–30	1.7	0.0897	18–30	2.0	0.079
18–30	2.0	0.106	18–30	2.2	0.087
18–30	2.2	0.116	18–30	2.5	0.099

*Triethylene diamine catalyst made by Houdry Process Corp., Philadelphia, Pa.

TABLE 2. FOAM RUBBER MATERIAL COST

Formulation

	Parts by Wt.	% by Wt.	$/Lb.
Natural rubber latex @ 43¢/lb. (solids basis)	35	26.8	0.115
Synthetic rubber latex @ 32¢/lb. (solids basis)	65	50.0	0.160
Clay @ 1½¢/lb.	20	15.4	0.002
Aux. raw materials @ 28¢/lb.	10	7.8	0.022
	130	100%	0.299

Losses	Uncored	Cored
Inventory and preparation	2.5%	2.5%
Overflow	—	6.5%
Defective product	2.0%	5.0%
	4.5%	14%
Material Cost/Lb. Salable Product	$0.313	$0.348

Compression (RMA) Lbs. @ 25% Defl.	Density (pfc)	Cost/ Bd. Ft. ($)	Compression (RMA) Lbs. @ 25% Defl.	Density (pfc)	Cost/ Bd. Ft. ($)
18	5.5	0.144	18	3.6	0.105
20	5.8	0.152	20	3.8	0.110
22	6.1	0.159	22	3.9	0.113
26	6.5	0.170	26	4.3	0.125

the American Society for Testing Materials[6] and The Rubber Manufacturers Association, Inc.,[7] and for urethane[8] and vinyl[9] foams by ASTM and the Society of the Plastics Industry.

An accepted simple measure of a foam's cushioning value is its compression resistance, commonly called compression. The usual commercial definition of compression is the load (in pounds) required to deflect 50 square inches of the product 25% of its original height.[6] (Admittedly, using a single point value does not tell the whole story about a foam's cushioning value. Foams with similar compressions at 25% deflection frequently have different compressions at 50% deflection, which is actually closer to the conditions under which most cushions are used.) The compression of most foam cushioning products falls between 18 and 30 pounds. Automobile seat topper pads are at the low end of the range, and medium-to-firm foam-rubber mattresses at the high end. Varying the chemical composition of a foam or modifying its physical characteristics can change its compression. Coring or contour cutting can give a foam compression and load-deflection properties it does not have in a solid piece; at the same time, such cutting can reduce cost by saving material.

Foam rubber is widely accepted as a standard of cushioning comfort; polyether-based urethane foam still exhibits a plateau effect in its load-deflection curve, and it therefore has a tendency to "bottom" in cushions. The cushioning properties of polyether-based urethane foam are now much nearer to those of foam rubber than the properties of the older polyester-based urethane foams; however, aging properties of polyether based foams are good. Vinyl foam can be made to have load-deflection properties similar to those of foam rubber, but compression-set properties of vinyl foam are less satisfactory.

Product Form

From the economic point of view, an important division of foam products is slab and molded. Slab foam is made in long lengths of varying widths and thicknesses and must be further fabricated to finished

[6] ASTM D 1055-58aT, "ASTM Standards 1958, Part 9," p. 1701. American Society for Testing Materials, Philadelphia 3, Pa.
[7] "Buyers' Specification—Latex Foam" (as revised Dec. 10, 1956). Rubber Manufacturers Association, Inc., 444 Madison Ave., New York 22, N. Y.
[8] ASTM D 1564-58T, "ASTM Standards, 1958, Part 9," p. 1722.
[9] ASTM D 1565-58T, "ASTM Standards, 1958, Part 9," p. 1733.

Economics of Flexible Foams—A Second Look

Present-day material costs for flexible urethane foam are lower than those for foam rubber, which reverses the situation as it existed in mid-1958 when the economics of flexible urethane and rubber foams were compared by this same author.

The major factor in urethane foam material cost reduction has been the decline in the price of tolylene diisocyanate. The price of natural rubber latex has increased during the same period, and foam rubber cost reduction is dependent on greater use of synthetic rubber latices and inexpensive inorganic loading materials, but the reductions achieved to date are much less than those with urethane foam.

In end-products, where cut slab can be used without additional fabrication, urethane foam is less expensive; when the cut slabs must be further fabricated, molded foam rubber is less expensive. As the closed molding technique for urethane foam is developed further commercially, it may become less expensive to use than foam rubber for such applications as contoured cushions.

shapes such as cushions. Molded foam is manufactured in finished shapes in individual closed molds. So far as cushioning properties are concerned, slab and molded foam are equivalent or can be made so. Coring or contour cutting imparts cushioning values and/or saves material and can be carried out with either slab or molded foam. If a given end-use requires substantial quantities of foam, molding is generally more economical because of savings in material and fabrication costs.

Because of the difficulties of controlling the many variables in the urethane foam reaction in a closed molding process, most urethane foam is made in large continuous buns; whereas most foam rubber is made in closed molds. Closed molding techniques for urethane are under intensive development. Closed molding of urethane has the disadvantage of slightly increasing product density, because of the collapse of cell walls at mold surfaces. Process improvements have reduced this effect, but it is still present to some extent. For this reason, as well as the inherently lower density of urethane, coring to save weight has not been so attractive as it is with foam rubber. Nevertheless, experiments have shown that weight can be saved in this way.

Fabrication of straight-line, square-cornered articles is most economical from slab, and slab urethane at its present lower price has made serious inroads on foam rubber for use in the so-called Danish modern furniture. As molding technology is improved, urethane can be expected to compete more and more with molded foam rubber in articles with crowned surfaces and rounded corners.

Material Costs

Tables 1 and 2 show the material costs for typical formulations of flexible urethane and rubber foams. Since the publication of last year's article[1] there has been a decline in the price of tolylene diisocyanate (TDI), one of the important raw materials for urethane foam, and an increase in the price of natural rubber latex. This change has reversed the economics of a year ago, when foam rubber material costs were less than those of urethane.

The compression of foam rubber can be varied only by changes in the amount of raw material used. Increasing the amount of rubber increases the compression. Coring, on the other hand, can be used to reduce effective piece density without reducing compression. Table 2 shows the dramatic effect of coring on foam rubber costs. More than 80% of all foam rubber produced is core stock; some of it is slab, but most is molded.

Urethane's compression is largely independent of density, at least in the range of 18-30 pounds. The cushioning value of urethane, however, is to some extent dependent upon density. At present, densities below 2 pcf. are not recommended for cushioning, although lower-density foams can be used as pads in arm rests and seat backs. The economic penalty of the present open-molding process for urethane is the large amount of waste that results when the rounded tops of the buns are trimmed off. Some of this material may be salable at low prices for stuffing uses. Despite the trim loss penalty, slab urethane material costs are generally below those of even molded foam rubber.

The density of vinyl foam ranges between 4.5 and 5 pounds per cubic foot, and compression between 12 and 18 pounds. It may be possible to develop vinyl foam formulations with lower densities and higher compressions, but they are not available at present.

The raw materials for vinyl foam are less expensive than those for either urethane or foam rubber. Dispersion-grade vinyl resin sells for 23¢ per pound, and plasticizers for under 30¢ per pound.

Plant and Processing Costs

The one-shot polyether process is used for the production of most flexible urethane foam. Some prepolymer is still used, but the belief in the trade is that the one-shot operation will become virtually universal. Closed molding is already being used in several plants for commercial products, although, as previously pointed out, most urethane foam is still made in continuous

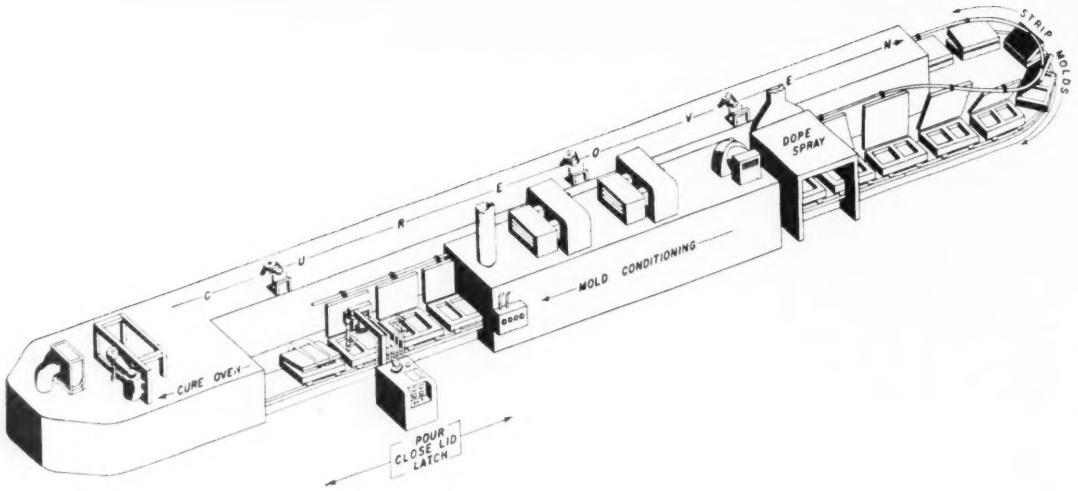


Fig. 1. Diagram of the urethane foam closed-mold production line which was built by the Mechanical Handling Systems, Inc., for the Chrysler Corp.

large buns with attendant high trim and fabrication losses. With the present process it may be possible to reduce trim loss to 25%. If, however, the top of the bun could be enclosed during the foaming process, loafing would be eliminated, and the trim loss greatly reduced or eliminated on slab foam. Methods of reaching this goal are under development.

As pointed out in last year's article,[1] the investment required for a one-shot, open-molding urethane plant is only about $100,000. Precise processing costs are not available, but they are believed to be low.

Table 3 shows plant and processing requirements for the manufacture of molded urethane and foam rubber. The costs of compounding urethane prepolymer (declining in use) and latex are not shown, but they are believed to be small. It appears that both plant and processing costs for molded urethane are lower than for foam rubber, principally because of urethane's lower curing temperatures and its greater toughness and ease of handling.

Figure 1 shows a diagram of a closed-mold urethane foam production line built by Mechanical Handling Systems, Inc., Detroit, Mich., for the Chrysler Corp.

By far the most critical part of a urethane plant is the mixing and pouring section, where chemical compositions and temperatures must be closely controlled. Before the development of the one-shot polyether system, mold filling was also critical.

Urethane foam precure takes place at 145° F. and can be accomplished with warm air. Foam rubber precure requires a temperature of 220° F. and is generally accomplished with steam. Because the urethane foam structure stabilizes rapidly, the molds can be turned on their sides, and a much smaller oven is required than for foam rubber.

By the time the mold reaches the stripping station, urethane has developed high toughness, and even large pieces can be stripped and handled by one man, without danger of tearing. Foam rubber, on the other hand, is extremely fragile; if the pieces are small, one man can strip and transfer them; but if they are large, two men are required. The necessity for a cell-breaking step has been largely eliminated in the one-shot polyether urethane system, which results in fewer closed cells than the old prepolymer system. Foam rubber

TABLE 3. PROCESS STEPS AND LABOR REQUIREMENTS FOR MOLDED FLEXIBLE FOAMS

Urethane		*Rubber*	
Process: One-shot polyether; closed molding		Process: Dunlop; closed molding	
Capacity: 10–12 million bd. ft/yr. (2.5 million lb.)		Capacity: 10–12 million bd. ft/yr. (5 million lb.)	
Plant cost:* $200,000		Plant cost:* $250,000	
In-process cycle: 1.5 hrs. excluding postcure storage		In-process cycle: 1.5 hrs.	
Process Step	Men Required	Process Step	Men Required
1. Mix and pour	1	1. Froth, pour, and level	1
2. Precure @ 140° F.	—	2. Precure @ 220° F.	—
3. Strip molds and transfer to cell-breaking (if necessary)	1	3. Strip molds and transfer to cell-breaking and washing	1 or 2
4. Transfer to postcure	—	4. Transfer to postcure	1
5. Postcure @ 250° F.	—	5. Postcure @ 270° F.	—
6. Transfer to storage for 4-7 days	1	6. Sort, repair, ship	not known
7. Sort, repair, ship	not known		

*Excludes land, buildings, molds, and facilities for compounding.

TABLE 4. POSSIBLE CHANGES AFFECTING FOAM MATERIAL* ECONOMICS

	Material Cost ($/Bd Ft.)	
Urethane	Slab — 2 pcf	Molded — 2.2 pcf
1. Present conditions	.106	.087
2. Reduction in TDI price to 65¢/lb.	.098	.081
3. Reduction of defective product to 5%	.100	.082
4. Reduction of trim loss on slab to 15%	.091	—
5. Combination of conditions 2, 3, and 4	.080	.076
Rubber	Uncored —5.8 pcf	Cored— 3.8 pcf
1. Present conditions	.152	.110
2. All synthetic latex @ 32 ¢/lb.	.137	.099
3. Clay loading (40 parts/100 parts of rubber)	.134	.097
4. Combination of conditions 2 and 3	.120	.087

*Foam with a compression of 20 pounds.

must be washed to remove traces of processing agents. Urethane requires no washing, because all of the components of the formulation take part in the reaction.

Postcuring of urethane is carried out at a temperature lower than that used for foam rubber; the foam's stability and toughness are also advantageous here, because the pieces can be stacked vertically and a smaller oven is required. Figure 2 is a view of the postcure oven at the Chrysler Corp. installation which shows the means for handling and the size of the oven.

Polyether-based urethane foam requires postcure aging of 3-7 days for maximum compression-set properties to be developed. The additional storage and handling is not known. Sorting, repairing, and shipping of urethane are probably somewhat less expensive than for foam rubber, because less damage occurs in process.

Future Foam Economics

Table 4 shows the effect of possible changes in raw-material prices and technology on foam economics. The figures are for foam with a compression of 20 pounds. The price of TDI could decline to 65¢ per pound. There is a decided trend toward the use of all-synthetic latex and increased inorganic loading in foam rubber. Defective products in molded urethane could be reduced to 5%, or about the level for molded foam rubber, and defective product loss and trim loss in slab stock could be decreased.

Summary and Conclusions

The net effect of the possible changes summarized in Table 4 is to keep urethane foam costs in both slab and molded form below those for foam rubber in the near-term future. In applications where cut slab can be used without additional fabrication, such as for flat, square-cornered cushions, finished articles can be made of urethane foam at a lower cost than from foam rubber. Where the cut slabs must be further fabricated to achieve rounded contours, molded foam rubber will remain less expensive until closed molding technology for urethane foam is more highly developed. Since closed molding of urethane foam is already in commercial use and under intensive study, it can be assumed that the necessary improvements will be forthcoming.

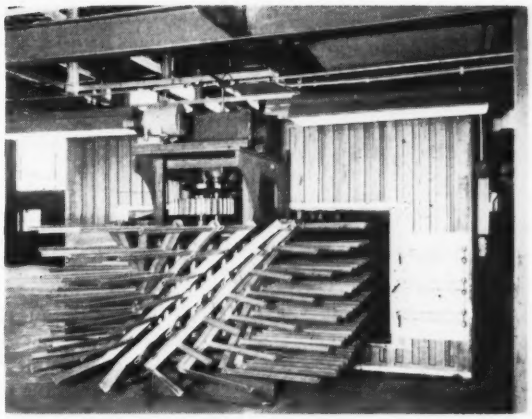


Fig. 2. A view of the postcure oven of the Chrysler Corp. installation. Carriers are inclined from horizontal and permit greater capacity in the same size oven

With the further development of the one-shot process for making polyether-based urethane foam, processing will be simplified, and a better quality product at a lower cost should be possible. This new one-shot process has also increased the possibility of molding urethane foam in closed molds.

Changes in the process for the manufacture of foam rubber have been in the direction of the greater use of lower-cost synthetic rubber latices and inorganic loading materials. No evidences were found, however, of as dramatic changes in the product or technology of foam rubber as are expected to continue with urethane foam.

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Polyether One-Shot Process

"One-Shot Polyether Urethane Foams Produced with Triethylenediamine," by W. E. Erner, A. Farkas, and P. W. Hill, Houdry Process Corp., was given before the Division of Paint, Plastics & Printing Ink Chemistry, ACS, on September 16 in Atlantic City, N. J. Foams of good physical properties without resort to prepolymer resulted.

Wing-Stay 100 as an Antiozonant[1]

By J. C. AMBELANG and B. W. HABECK
The Goodyear Tire & Rubber Co., Akron, O.

THE deleterious effect of ozone on stretched rubber articles has been known for a long time. In 1885, W. Thomson[2] recognized this effect, and since that time much work has been done toward avoiding the situation or protecting rubber against ozone attack. The advent of the SBR polymers, and their widespread use after World War II, increased the need of a solution to the ozone problem since the SBR vulcanizates proved to be very susceptible to ozone attack. The need has been considerably emphasized by the increasing concentrations of ozone in certain urban areas.

B. S. Biggs[3] lately published a comprehensive review of the status of work done in connection with ozone attack. He points out some facts that were found to be particularly true in the work undertaken for this paper.

Quoting verbatim: "Laboratory tests are primarily of value because they give answers faster than outdoor, or service tests. There are at least two principal weaknesses of laboratory tests for antiozonants: (1) that by subjecting a sample to ozone continuously and in higher concentration than it would experience in service, one might fail an antiozonant whose rate of migration to the surface is slow, but adequate for coping with atmospheric concentrations; and (2) that a particularly volatile antiozonant might be effective in a laboratory test, but in outdoor service might soon be lost."

To these weaknesses in laboratory testing must be added lack of the effects of weathering, i.e., sun, rain, temperature change, etc., plus the susceptibility of the antiozonant itself to attack by oxygen. The writers, along with Spacht, Hollingshead, and Lichty,[4] have attempted to take these weaknesses into account. As a result, it has been determined that the mixture of diaryl-p-phenylenediamines under study here, (Wing-Stay 100), has excellent qualities as a persistent antiozonant.

Assessment of Ozone and Weather Cracking

Very many methods have been offered for the assessment of ozone and weather cracking. Biggs[3] discussed a sizable number of these methods in his recent review.

In the study reported herein, the authors have used a visual examination with a numerical system of reporting for the following reasons:

1. *Practical significance.* In tire stocks, the appearance of the rubber is seriously impaired long before its measurable performance is affected.
2. *Speed.* With a small amount of training and experience, the operator is able to rate a much larger number of samples by visual examination than he would be able to handle by finer measurements requiring an instrument such as a microscope.
3. *Adaptability.* Since visual examination requires no

[1]Presented before the Division of Rubber Chemistry, ACS, May 13, 1959, Los Angeles, Calif.
[2]*Soc. Chem. Ind.*, 4, 710 (1885).
[3]*Rubber Chem. Tech.*, 31, 1015 (1958).
[4]RUBBER WORLD, 139, 863 (1959).

Antiozonant for SBR Vulcanizates

The antiozonant, Wing-Stay 100, which is described as a mixture of diaryl-p-phenylenediamines, was evaluated as to its effectiveness as a protective agent for SBR polymers against ozone. Tests in the laboratory plus tire road tests indicate that this chemical, having low volatility and low oxidation rate, exhibits considerable persistence and relatively long lasting protection.

A visual method of rating cracking due to ozone in test samples was developed in the course of these investigations which permits rating of any-type sample such as test strip, tire sidewall, or other vulcanized part. A two-part numerical system rates first the amount of cracks and second the size of cracks. These ratings are then multiplied with the product being designated as the "Weathering Index" which may be easily used for charts and graphs.

The evaluation was conducted using cold SBR 1500 and oil-extended SBR 1712. In evaluations with several dihydroquinolines and dialkyl-p-phenylenediamines the Wing-Stay 100 showed particular persistence even in samples which were oven aged before exposure to ozone or weather.

Safety in processing is also claimed for this antiozonant. Scorch data included in the tables indicate that little or no activation occurs from the use of this material.





B. W. Habeck J. C. Ambelang

The Authors

Joseph C. Ambelang, senior compounder, compound development, Goodyear, received his B.S. in Chemistry at the University of Akron (1935) and his Ph.D. at Yale University (1938).

After further study and teaching both at Yale and D'Youville College, Dr. Ambelang in 1942 joined the organic chemicals division of the Firestone Tire & Rubber Co., doing compound development. He took his present position with Goodyear in 1956.

He is a member of the American Chemical Society and its Organic and Rubber divisions. He also belongs to Sigma Xi, Summit County Historical Society, and the Yale Club of Akron.

Bruce W. Habeck, senior development engineer, on rubber and rubber chemicals, Goodyear, received his B.S. in Chemical Engineering at the University of Wisconsin.

His career has been with Goodyear, starting in pilot-plant operations in 1942. He served in the Office of the Synthetic Rubber Coordinator from 1943 to 1945. Since then he has been in chemical materials development, working first on breathable coated fabrics for Navy flying suits and later on nitrile rubber and rubber chemicals compounding. He holds a patent on the breathable fabric, Vapotex.

Mr. Habeck is a member of the American Chemical Society.

special sample preparation, it is as adaptable to tires as it is to test strips. Since it is a non-destructive test, it can be applied repeatedly to the same sample over a long term of exposure. Progress in cracking can then be plotted.

4. *Uniformity*. Different observers will agree to a rating assigned to a given specimen, and this rating can be referred to at later dates with assurance that it is meaningful. This means that work done in various parts of the country in a large organization will be reported uniformly.

Visual rating does have the objection of subjectivity. The degree of subjectivity can be minimized by standardizing the conditions of observation, such as lighting, magnification (if used), and comparison with photographic standards. These same expedients have proved successful in quality control and colorimetric analysis.

Numerical rating has the advantage of speed. In the scanning of a page or more of test results, and the evaluating of the data, a numerical rating has considerable advantage over verbal descriptions or photographs. It is also faster to record.

Numerical ratings do have the admitted limitation of being less flexibile than a verbal description. The greater flexibility of words is, however, accompanied by their variable meaning, which depends upon the reader as well as the writer. While at times it is necessary to use a description even in the numerical system, it must be kept in mind that the weathering process itself does not give the highest degree of repeatability in results. With the system described below (illustrated in Figures 1 and 2) that is used in this paper, the

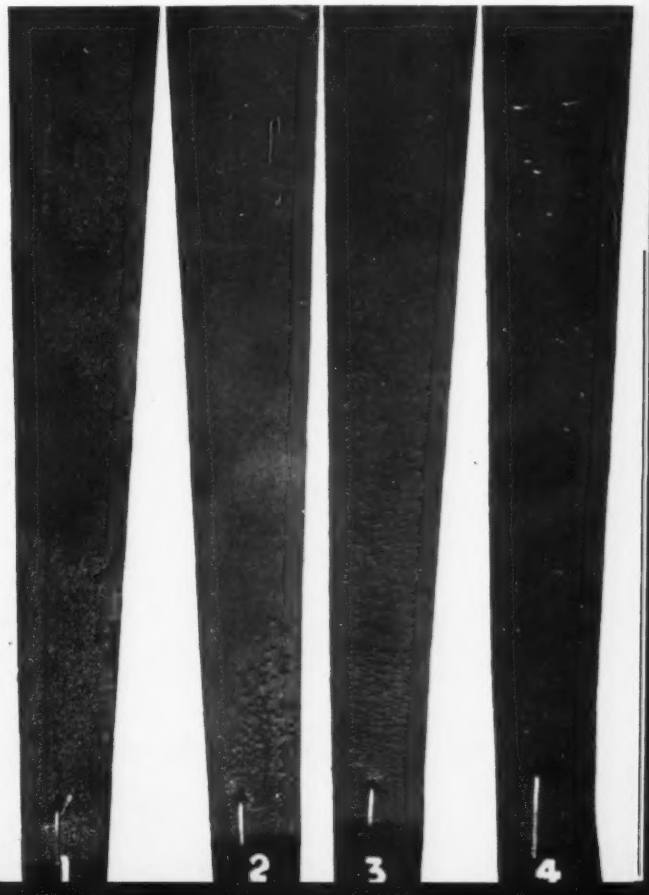


Fig. 1. Photographic standard for use in assigning rating number which indicates number of cracks present. Rating and equivalents are:

Numerical Rating	Verbal Equivalent	Meaning
1	very few	less than 1/8 of surface covered
2	few	1/8 to 3/8 of surface covered
3	moderate	3/8 to 3/4 of surface covered
4	heavy	more than 3/4 of surface covered

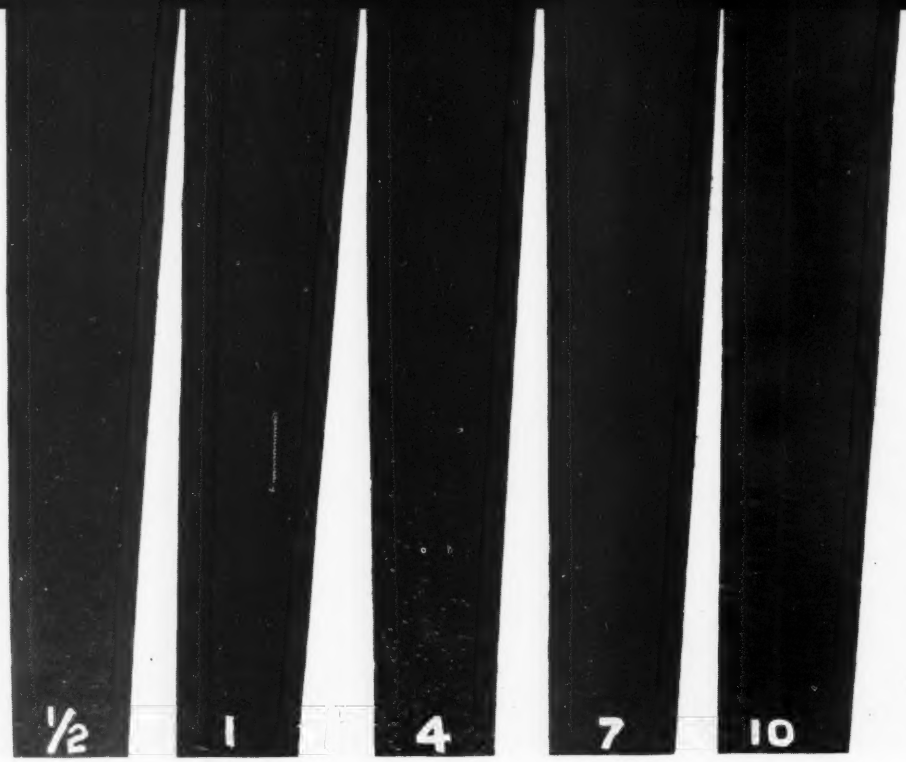


Fig. 2. Photographic standard for use in assigning rating number which indicates the severity of the cracks present. Rating and equivalents are:

Numerical Rating	Verbal Equivalent	Meaning
½	very fine	less than 0.01-inch in length
1	fine	0.01- to 0.02-inch in length
4	medium	0.04-inch in length
7	coarse	0.10-inch in length
10	severe	0.25-inch in length

Cracks which are invisible without magnification are rated 0

writers have assigned definite meanings and verbal equivalents to the numbers used. The state of weathering or ozone cracking in any test strip is then expressed in terms of these numerical symbols. Two numbers are assigned to each weathered loop or strip; the first one indicates the number of cracks; and the second the size of the cracks.

Numerical Rating Procedure

The experimental strips were rated by comparison

TABLE 1. ANTIOZONANTS USED IN THE STUDY, WITH ABBREVIATIONS USED IN THE TEXT AND THE TRADE NAME OF THE MATERIAL UTILIZED

Abbreviation	Chemical Name	Trade Name
EDT mq	6-ethoxy-1,2-dihydro-2,2,4-trimethyl-quinoline	Santoflex AW*
DT mq	polymerized 1,2-dihydro-2,2,4-trimethyl-quinoline	AgeRite Resin D†
Dmh-pPD	N,N′-di 3-(5-methyl-heptyll-p-phenylenediamine	UOP-88‡
DO-pPD	N,N′-di 2-octyl-p-phenylenediamine	UOP-288‡
PBNA	phenyl-β-naphthylamine	AgeRite Powder†

*Monsanto Chemical Co., rubber chemicals department, Akron, O.
†R. T. Vanderbilt Co., New York, N. Y.
‡Universal Oil Products Co., Des Plaines, Ill.

TABLE 2. PARTIAL FORMULAS OF COMMON INGREDIENTS USED IN THE TEST COMPOUNDS THROUGHOUT THIS STUDY

Ingredients	Partial Formula A	B	C	D
Zinc oxide	3.00	3.00	3.00	3.00
Stearic acid	1.50	—	1.50	1.00
HAF black	40.00	40.00	50.00	68.75
EPC black	10.00	10.00	—	—
Paraffin wax (M.P. 145° F.)	1.50	1.50	1.50	1.50
Asphaltic softener	3.50	3.50	10.00	—
Light process oil	3.50	3.50	—	—
N-cyclohexyl-2-benzothiozole sulfenamide	1.25	1.25	—	—
MBTS	—	—	1.25	1.00
DPG	—	—	0.40	0.30
Sulfur	2.00	2.00	1.75	2.00
	66.25	64.75	69.40	77.55

[These ingredients were compiled into this separate table to conserve space and eliminate confusion in the remaining five tables. EDITOR.]

with the photographed standards. Actual measurements of crack length were made in doubtful cases, and numbers between 1 and 4, 4 and 7, and 7 and 10 were assigned as needed. Plus and minus signs were used to indicate slight differences within a single series of test strips. In general, the predominant crack lengths were reported. When no one crack size predominated within the strip the range of sizes was recorded.

As an illustration, the strip numbered 4 in Figure 2 would be assigned a full rating of (3,4). The first figure, 3, indicates that the surface of the strip was approximately half covered with cracks. The second figure 4, indicates that the predominant crack size was close to 0.04-inch. In verbal terms, the cracking would be described as *moderate-medium.*

The range of 0 to 10 for crack size was assigned because the authors regard severity of cracking as more serious than the number of cracks. In drawing the graphs for this paper, the two numbers were multiplied, with the resulting product titled "Weathering Index." Thus a strip with heavy, severe cracks would be assigned a rating of (4,10) and graphed as 4 X 10 or 40. A strip completely covered with fine cracks was rated (4,1) and graphed as 4 X 1 or 4. Plus or minus signs were weighted as quarter points in computing the Weathering Index. When a range of crack sizes was observed, the midrange was used in computing the index.

TABLE 3. WING-STAY 100 EVALUATED IN ORDNANCE STANDARD ANTIOZONANT FORMULA

	Compound No. BX27J-				
Ingredients	4333	4334	4335	4336	4337
SBR 1500	100.00	100.00	100.00	—	—
1006	—	—	—	100.00	100.00
Dmh-pPD	2.00	—	—	—	—
EDT mq	2.00	—	—	—	—
Wing-Stay 100	—	3.00	4.00	3.00	4.00
Partial formula A	66.25	66.25	66.25	—	—
B	—	—	—	64.75	64.75
	170.25	169.25	170.25	167.75	168.75
Properties on Stock Cured 60 min. at 292° F.					
Tensile strength, psi.	3650	3575	3450	3125	2975
Elongation, %	555	505	495	410	415
Modulus @ 300%, psi.	1575	1775	1750	2075	1900
Durometer hardness, Shore A	63	64	64	64	63
Mooney scorch @ 250° F., min. to 5-pt. rise	32.0	55.0	57.0	43.5	42.0
Ozone Cracking (Ozone Box)					
Kinetic test, rating	(1e,1)*	(2,1⁻)	(1e,1)	(1e,1)	(1e,1)
Weather Cracking (Akron)					
Kinetic test, rating	(4,3-6)	(3⁺,2-4)	(3⁺,2-3)	(4⁻,2-4)	(4⁻,3)

*e indicates cracking on edges only.

TABLE 4. EVALUATION OF ANTIOZONANT LEVEL OF WING-STAY 100 IN SBR 1500 AND SBR 1500C

	Compound No. BX27J-							
Ingredients	4317	4318	4319	4320	4321	4322	4323	4324
SBR 1500	100.00	100.00	100.00	100.00	100.00	—	—	—
1500C	—	—	—	—	—	100.00	100.00	100.00
Wing-Stay 100	—	1.00	2.00	3.00	4.00	1.25	2.25	3.25
Partial formula C	69.40	69.40	69.40	69.40	69.40	69.40	69.40	69.40
	169.40	170.40	171.40	172.40	173.40	170.65	171.65	172.65
Properties on Stock Cured 60 Min. at 292° F.								
Tensile strength, psi.	3800	3600	3750	3525	3550	3650	3875	3700
Elongation, %	575	555	585	560	585	565	595	575
Modulus @ 300%, psi.	1600	1625	1625	1575	1525	1650	1625	1650
Durometer hardness, Shore A	64	64	63	64	63	63	64	63
Mooney scorch at 250° F., min. to 5-pt. rise	38.5	39.5	58.0	no rise	41.5	41.0	40.5	41.5
Ozone Cracking (Ozone Box)								
Kinetic test, rating	(4,7)	(4,4)	(4,2)	(4,1)	(4,1½)	(4,2)	(4,1)	(4,1½)
Weather cracking (Akron)								
Kinetic test, rating	(4⁻,7-10)	(3,3-4)	(3,3-4)	(3,1-2)	(1,1e)	(3⁺,2-3)	(3,1-2)	(1,1e)
Days to break	32	21	—	—	—	—	—	—
Weather Cracking (Akron) on Oven Aged Samples								
Kinetic test, rating	(4⁻,8)	(3,5)	(3,2-3)	(3⁻,1)	(1,1e)	(3,3-2)	(2,1)	(1,1e)
Days to break	40	—	—	—	—	—	—	—
Weather Cracking (Akron) Static Test, 6 Months' Exposure								
Unaged samples, rating	(4,2-3)	(4,3)	(2,1)	0	0	(2,1)	0	0
Aged samples, rating	(4,2)	(4,2)	0	0	0	0	0	0
Weather Cracking (Los Angeles) Static Test								
Exposure: 9 days, rating	(2,2)	(1,2)	0	0	0	(1,1)	0	0
51 days, rating	(4,4)	(4,6)	(1,1)	0	0	(2,4)	(1,1)	0
113 days, rating	(4,9)	(4,9-10)	(4,6-7)	(3⁺,3-4)	(1,1)	(4⁻,9)	(3,4-6)	(1,1)

Note: e indicates cracking on edge only.

This system resembles the method of Creed, Hill, and Breed,[5] but the numerical ratings are reported directly and are readily convertible into verbal equivalents. Creed and his coworkers performed certain mathematical operations on their initial readings.

Experimental Details

The protective agents compared with Wing-Stay 100 are listed in Table 1, with the abbreviation used in this paper and the trade names of commercially available materials used.

The formulas used in this study are all tread-type compounds with minor variations depending on type of polymer and conforming with the Ordnance Standard Test Formula.[6] Only the polymer and antiozonant quantities are included in the test data tables in order to conserve space and reduce confusion. Table 2, however, contains the remaining ingredients in proper proportions which may be used to establish the complete formula in any case where it may be desired.

Wing-Stay 100, at two levels, was substituted for the antiozonants in the Ordnance Standard Ozone Resistant Stock.[6] The same two levels were also tested in a stock based upon SBR 1006 in place of SBR 1500. Formulas and test data are shown in Table 3.

A concentration range of Wing-Stay 100 from 0 to 4 phr. was evaluated in tread-type test formulas based upon SBR 1500 (Table 4) and SBR 1712 (Table 6).

[5] *Anal. Chem.*, 25, 241 (1953).
[6] Ordnance Corps, Ordnance Spec. MIL-T-12459 E CO 40996-7 (Sept. 24, 1956).

TABLE 5. ANTIOZONANTS TESTED IN SBR 1500

	Compound No. BX27J-					
Ingredients	4299	4300	4301	4302	4303	4304
SBR 1500	100.00	100.00	100.00	100.00	100.00	100.00
Wing-Stay 100	2.00	—	—	—	—	—
EDT mq	—	2.00	—	—	—	—
DT mq	—	—	2.00	—	—	—
Dmh-pPD	—	—	—	2.00	—	—
DO-pPD	—	—	—	—	2.00	—
PBNA	—	—	—	—	—	2.00
Partial formula C	69.40	69.40	69.40	69.40	69.40	69.40
	171.40	171.40	171.40	171.40	171.40	171.40
Properties on Stock Cured 60 Min. at 292° F.						
Tensile strength, psi.	3750	3350	3850	3425	3650	3725
Elongation, %	555	525	585	540	575	565
Modulus @ 300%, psi.	1725	1625	1675	1550	1500	1625
Durometer hardness, Shore A	63	62	63	62	61	63
Mooney scorch @ 250° F., min. to 5-pt. rise	43	38	42	32	22	38
280° F. min. to 5-pt. rise	14	12	13.5	11.5	9	13
Ozone Cracking (Akron) Kinetic Test						
Unaged samples, rating	(4,1)	(4,1½)	(4,1½)	(3,2)	(3,1)	(4,7-8)
Aged samples, rating	(4,1½-1)	(4,1-3)	(4,1-3)	(4,1-2)	(4,1½-2)	(4,4-8)
Weather Cracking (Akron) Kinetic Test						
Unaged samples, rating	(3⁺,2)	(4,3)	(4⁻,7)	(3,1)	(3,2⁻)	(4⁻,10)
Aged samples, rating	(3,1)	(4⁻,3⁺)	(4⁻,3)	(3,2)	(3⁻,2⁺)	(4⁻,3-6)
Weather Cracking (Akron) Static Test (Wedge Strips)						
Unaged samples, rating (6 mos.' exp.)	0	(4,1⁺)	(3,2)	0	0	(4,3)
Aged samples, rating (3 mos.' exp.)	(3,1)	(4,2⁻-3)	(4,2-3)	(3⁻,4-6)	(3⁻,3-4)	(broke)
Weather Cracking (Los Angeles) Static Test (Wedge Strips) 4 Months' Exposure						
Unaged samples, rating	(4,6)	(4,6-10)	(4,10)	0	(1,4)	(4,10)
Aged samples, rating	(4,4-5)	(4,8-9)	(4,10)	(4,10)*	(4,10)*	(4,8-9)
Weather Cracking (Akron) Static Test (ASTM Loops)						
Unaged samples, rating (8 mos.' exp.)	0	(4,1)	0	0	0	0
First cracks observed mos.	—	6	—	—	—	—
Aged samples, rating (6 mos.' exp.)	(4,3)	(4,5)	(4,5)	(4,3⁺)	(4,3)	(3,2)
First cracks observed, wks.	2	2	4	4	4	6
Weather Cracking (Los Angeles) Static Test (ASTM Loops) 4 Months' Exposure						
Unaged samples, rating	(3,6)	(4,8-9)	(3,10)	0	0	(4,9)
First cracks observed, wks.	7	7	7	—	—	7
Aged samples, rating	(3,4)	(3,8)	(3,8⁺)	(1,10)*	(3,10)*	(4,9)

*Samples broke.

TABLE 6. EVALUATION OF ANTIOZONANT LEVEL OF WING-STAY 100 IN SBR 1712 AND SBR 1712 C

	Compound No. BX27J-							
Ingredients	4325	4326	4327	4328	4329	4330	4331	4332
SBR 1712	137.50	137.50	137.50	137.50	137.50	—	—	—
1712 C	—	—	—	—	—	137.50	137.50	137.50
Wing-Stay 100	—	1.00	2.00	3.00	4.00	1.25	2.25	3.25
Partial formula D	77.55	77.55	77.55	77.55	77.55	77.55	77.55	77.55
	215.05	216.05	217.05	218.05	219.05	216.30	217.30	218.30
Properties on Stock Cured 80 Min. at 292° F.								
Tensile strength, psi.	3325	3175	3325	3375	3300	3425	3375	3325
Elongation, %	525	495	525	545	545	545	535	545
Modulus @ 300%, psi.	1675	1675	1625	1575	1575	1675	1675	1550
Durometer hardness, Shore A	61	59	59	60	59	60	60	61
Mooney scorch @ 250° F., min. to 5-pt. rise	28.0	30.5	31.0	32.5	31.5	48.0	57.0	36.0
Ozone Cracking (Ozone Box)								
Kinetic test, rating	(4,4-6)	(4,3-4)	(4,1-2)	(4,1-2)	(4,1-2)	(4,1-2)	(4,1$^+$)	(4,1$^+$)
Weather Cracking (Akron) Kinetic Test, 42 Days' Exposure								
Unaged samples, rating	(4,9)	(4,6)	(4,4-5)	(4,2-3)	(4,1-2)	(4,4)	(4,3)	(4,2-3)
Aged samples, rating	(4,6)	(4,3)	(4,2-3)	(4$^-$,2-3)	(4$^-$,2$^-$)	(4,3)	(4,2)	(4,1-2)
Weather Cracking (Akron) Static Test, 6 Months' Exposure								
Unaged samples, rating	(4,7)	(4,7)	(4,6-7)	(4,6)	(4,6)	(4,5)	(4$^-$,5)	(3,4)
Aged samples, rating	(4,3)	(4,4)	(4,4-7)	(4$^-$,4-6)	(3$^+$,3)	(4,4-7)	(4$^-$,4-6)	(3,3)
Weather Cracking (Los Angeles) Static Test, 3 Months' Exposure								
Unaged samples, rating	(4,9)	(4,9)	(4,9)	(4,8)	(4,8)	(4,9)	(4,8)	(4,8)

Three levels of Wing-Stay 100 were duplicated in SBR 1500C and SBR 1712C, which polymers are already stabilized with Wing-Stay 100 in their manufacture. The oil-extended rubber, SBR 1712, required further modification (Table 6).

To compare Wing-Stay 100 with other antiozonants, the same base formulas were used. In SBR 1500 the antiozonants were compared at 2.0 phr, (Table 5); in SBR 1712, at 2.5 phr (Table 7).

Ozone and Weathering Tests Conducted

All weather test strips were cut from 0.075-inch gage sheets which had been cured in chrome-plated molds without lubricant. Considerable care was taken not to touch the surface of these sheets with anything except Holland cloth once cure had been effected.

OZONE. Static and kinetic ozone cracking were evaluated on 6- by 1-inch strips. The static test consisted of stretching the strip to 12½% elongation and then exposing the strip to 50 pphm. ozone in either a Mast Model 700-17 or Bush[8] oxone chamber for 30 days at 100° F.[6]

The kinetic test was run primarily by stretching the strip from 0 to 10% elongation at 80 cycles per minute for a period of 48 hours while exposed to 50 pphm. ozone at 100° F. A modified procedure was used to try to simulate the dynamic ozone test specified in the Ordnance specification.[6] This modified test was run for the same period, 48 hours, and at 80 cycles per minute, but with only 30 pphm. ozone, at 82° F., and with the stretch from 0 to 5% elongation. In the writers' experience this modification has proved to be more severe than the Ordnance test. All kinetic tests were made in a Mast machine, Model 644-2.

Kinetic weathering tests were all made in Akron in the Summer of 1958 by the procedure outlined by Fielding,[9] which involves stretching from 0 to between 10 and 22% at 60 cycles per minute.

WEATHERING. Static weather cracking was observed on wedge shaped strips as described by Fielding,[9] that is, at an average elongation of 15%, and exposed in Akron and Los Angeles in the Summer and the Fall of 1958.

Looped tests were made according to ASTM Specifications, Method B, D 518-44.[10]

AGED OZONE AND WEATHERING. Oven aging was for a period of 48 hours at 212 ± 2° F. in a forced circulation oven.

To check against the possibility that the antiozonants might migrate or transfer from sample to sample in the oven, duplicate tests were run in test tubes. The test tube aging was conducted in an aluminum block, Scott Tester Model LG,[11] suitable for ASTM D 865. The test tubes were vented, but no forced circulation of air was provided. Since the results of test tube aging differed only slightly from oven aging, the weathering data from these tests were not included in the tables.

[7]Mast Development Co., Inc., Davenport, Iowa.
[8]G. F. Bush Associates, Princeton, N. J.
[9]India RUBBER WORLD, 115, 802 (1947).
[10]"ASTM Standards on Rubber Products," p. 276. American Society for Testing Materials, Philadelphia, Pa. (1957).
[11]Scott Testers, Inc., Providence, R. I.



Fig. 3. Multi-section test tire in the Los Angeles, Calif., area from October, 1957, to December, 1958, for 13,500 miles. Section of tire to left of center protected with DO-pPD, and section to right of center protected with Wing-Stay 100 *(top photo)*

Fig. 4. Test tire operated on outdoor weathering test wheel at Los Angeles for 20,000 miles during November and December, 1958, with Wing-Stay 100 for antiozonant protection

Fig. 5. Multi-section test tire exposed to static weathering conditions at Los Angeles from September, 1957 to December, 1958. Section to left of center protected by Wing-Stay 100, and section to right of center protected by DO-pPD *(bottom photo)*

In the course of this study it became apparent that the static ozone test employed was of very little value in distinguishing among antiozonants or levels of a single antiozonant. This point was probably true because the stocks carried a protective wax bloom that remained undisturbed during the exposure period in the ozone box. A test requiring more than a month can hardly be termed an *accelerated* test for tire compounds.

Kinetic or dynamic[12] ozone cracking showed a fairly satisfactory correlation with kinetic weather cracking, particularly if, along with the unaged samples, heat aged samples were exposed. A fast migrating, but volatile and/or oxidizable antiozonant will not show up so favorably in heat aged samples, though it appears most promising in the unaged stock. This difference is of utmost practical importance in any rubber product which is expected to resist weather aging longer than a year.

While static ozone tests are of use in evaluating waxes, kinetic ozone or weathering tests are generally much more useful in evaluating chemical antiozonants, and these require less time to run. Smith and Tuley[13] found much the same to be true, stating that outside kinetic or wheel weathering was the most desirable type of test. Since kinetic cracking is not so sensitive to irregularities of the surface film, it is more duplicable than static cracking. In addition, the continuous shift in strain results in a more uniform distribution of cracking. For these reasons the more effective, new antiozonants have been developed with the aid of kinetic tests.[5, 13, 14]

Evaluation of antiozonants by static weathering is, of course, most rapid in the Los Angeles area and is important since it is doubtful if waxes alone afford adequate protection. Oven aged strips must also be included in static weathering tests, and in any accelerated weathering test for the reasons discussed above for kinetic tests.

Road Tests on Tires

A multi-section sidewall tire on a private car in the Los Angeles area was road tested for 13,500 miles over a period of 14 months. The cracking developed is shown in Figure 3. The Wing-Stay 100 in the one section and the DO-pPD in the other section were added at the level of 3 phr. to stocks otherwise equivalent.

Another tire with the same amount of Wing-Stay 100 in the sidewalls was run on an outdoor wheel in Los Angeles, similar to that described by Smith and Tuley.[13] After 20,000 miles the sidewall in Figure 4 showed less severe cracking than the duplicate stock in Figure 3, right.

Static Weathering in Tires

A multi-section sidewall tire was mounted, inflated, and exposed on a roof in Los Angeles for 15 months (Figure 5). The test compared Wing-Stay 100 with DO-pPD at 3 phr. in the same formulation with accelerators adjusted to the same cure rate.

Discussion of Results

In the Ordnance Standard Ozone Resistant Stock,

[12]The writers regard *kinetic* as a more exact description of the test than dynamic.

[13]RUBBER WORLD, 140, 243 (1959).

[14]F. C. Bruce, R. E. Isley and B. Hunt, Report No. 57, Burke Research Co. to Detroit Arsenal on Project No. TT1-718, Oct. 1, 1957, Contract No. DA-20-089-ORD 36531.

Wing-Stay 100, at 3 to 4 phr., was found to be equivalent in ozone resistance to the combination of Dmh-pPD and EDT mq prescribed in the Ordnance formulations. (See Table 3.) In kinetic weathering over a four-month period, Wing-Stay 100 showed greater persistence than the prescribed combination of antiozonants. (See Figure 6.)

During evaluation of effective level of Wing-Stay 100 in SBR 1500 it was found that resistance to ozone cracking and weather cracking increased (index decreased) as the Wing-Stay 100 was increased from 1 to 4 phr. (See Table 4 and Figures 7 to 11.) In Akron, 3 phr. appeared to be adequate; in Los Angeles, 4 phr. gave a notable further improvement.

Wing-Stay 100, included in the SBR 1500C type polymer as a stabilizer, is available in the vulcanizate as antiozonant. Hence data indicate that about 0.75 phr. can be deducted from the amount of the an-

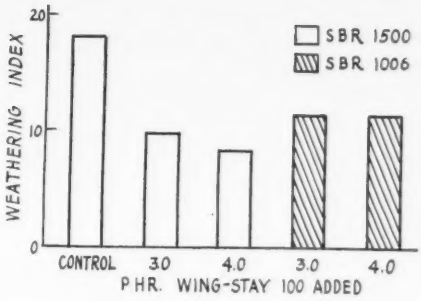


Fig. 6. Kinetic weathering of test vulcanizates using Ordnance Standard Ozone Resistant Formula as standard and substituting Wing-Stay 100 in various amounts for the standard antiozonants. Exposed in Akron from July to October, 1958

TABLE 7. ANTIOZONANTS TESTED IN SBR 1712

Ingredients	Compound No. BX27J-					
	4311	4312	4313	4314	4315	4316
SBR 1712	137.50	137.50	137.50	137.50	137.50	137.50
Wing-Stay 100	2.50	—	—	—	—	—
EDT mq	—	2.50	—	—	—	—
DT mq	—	—	2.50	—	—	—
Dmh-pPD	—	—	—	2.50	—	—
DO-pPD	—	—	—	—	2.50	—
PBNA	—	—	—	—	—	2.50
Partial formula D	77.55	77.55	77.55	77.55	77.55	77.55
	217.55	217.55	217.55	217.55	217.55	217.55
Properties on Stock Cured 60 Min. at 292° F.						
Tensile strength, psi.	3450	3050	3475	3400	3150	3325
Elongation, %	560	535	605	605	580	585
Modulus @ 300%, psi.	1675	1475	1450	1425	1350	1475
Durometer hardness, Shore A	61	59	60	59	58	59
Mooney scorch @ 250° F., min. to 5-pt. rise	30.5	30.5	31.5	23.0	16.0	26.5
280° F., min. to 5-pt. rise	11.0	10.5	11.5	9.5	7.5	10.5
Ozone Cracking (Ozone Box) Kinetic Test						
Unaged samples, rating	(4,1-2)	(2,1-2)	(4,3-4)	(1,2)	(1,1)	(4,4)
Aged samples, rating	(4,2-3)	(4,6-8)	(4,6)	(4,6⁻)	(4,6)	(4,4)
Weather Cracking (Akron) Kinetic Test, 30 Days' Exposure						
Unaged samples, rating	(4,3)	(4,3-4)	(4,7)	(3,1)	(4⁻,1⁺)	(4,10)*
Aged samples, rating	(3⁺,2-3)	(4,7)	(4,6)	(4,3-4)	(4⁻,6)	(4,8)
Weather Cracking (Akron) Static Test (Wedge Strips)						
Unaged samples, rating (6 mos.' exp.)	(4,6)	(4,4)	(4,8)	0	0	(4,4⁻)
Aged samples, rating (3 mos.' exp.)	(4⁻,3-5)	(4,4)*	(4,4)	(4,4-7)	(4,4-7)	(4,3)
Weather Cracking (Los Angeles) Static Test (Wedge Strips), 7 Weeks' Exposure						
Unaged samples, rating	(4,8)	(4,6)	(4,10)	(1,2)	(1,5)	(4,7)
Aged samples, rating	(4,7)	(4,6)	(4,8)	(4,8)	(4,8)	(4,8)
Weather Cracking (Akron) Static Test (ASTM Loops)						
Unaged samples, rating (8 mos.' exp.)	(3,1)	(4,2⁺)	(3,2⁺)	0	0	(4,1⁺)
First cracks observed, mos.	2½	1	2½	—	—	2½
Aged samples, rating (6 mos.' exp.)	(3,1)	0	0	0	0	0
First cracks observed, wks.	9	—	—	—	—	—
Weather Cracking (Los Angeles) Static Test (ASTM Loops), 7 Weeks' Exposure						
Unaged samples, rating	(2,7)	(2,7)	(2,8)	0	0	(2,8)
First cracks observed, wks.	7	1	1	—	—	1
Aged samples, rating	(2,5)	(3,8)	(3,8)	(3,8)	(3,8)	(3,8)
First cracks observed, wks.	1	1	1	1	1	1

*Samples broke.

Fig. 7. Weathering index for increasing amounts of Wing-Stay 100 in SBR 1500 and SBR 1500C tested in the kinetic test in Mast ozone chamber

Fig. 8. Various levels of Wing-Stay 100 in SBR 1500. Subjected to kinetic weathering test in Akron

Fig. 9. Various levels of Wing-Stay 100 in SBR 1500C. Subjected to kinetic weathering test in Akron

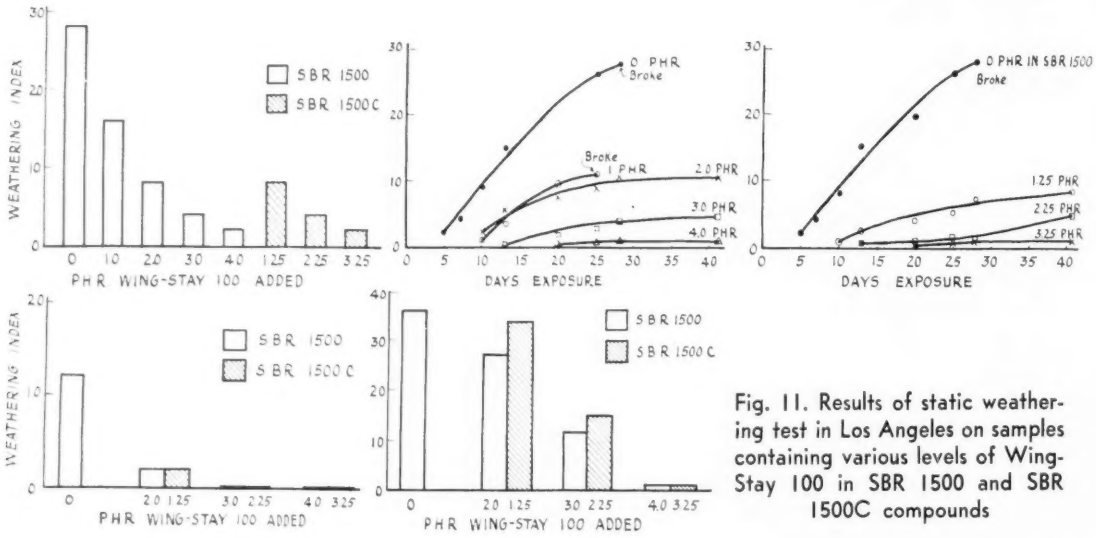


Fig. 11. Results of static weathering test in Los Angeles on samples containing various levels of Wing-Stay 100 in SBR 1500 and SBR 1500C compounds

Fig. 10 *(left)*. Results of static weathering test in Akron on samples containing various levels of Wing-Stay 100 in SBR 1500 and SBR 1500C compounds

tiozonant added in compounding. (See Figures 7, 9, 10, and 11.)

A comparison of the antiozonants in SBR 1500 was made at the 2.0 phr. level in the same base stock as described above. (See Table 5 and Figures 12 to 16.) Kinetic weathering and ozone exposure on the unaged stocks rated Wing-Stay 100 intermediate in activity between the dihydroquinolines (EDT mq and DT mq) and the dialkyl-p-phenylenediamines (Dmh-pPD and DO-pPD) (Figure 13). After aging for two days at 212° F., however, ozone and weather tests showed the Wing-Stay 100 to be the most active antiozonant of those tested (Figure 14). Thus, the lower rate of volatilization and oxidation reported by Spacht, Hollingshead, and Lichty[4] resulted in longer protection against ozone. The same effect was observed in static weathering of strips exposed in Los Angeles. (See Figures 17 and 18.)

Effective level of Wing-Stay 100 in SBR 1712 was also determined. In this oil-extended polymer, the optimum level appeared close to 4 phr. While the static ozone resistance was good, even at one phr. (not shown), the static weather cracking was more severe than in SBR 1500. This result suggests that not enough was included in the compound. (See Table 6 and Figures 10-11, 19-21.) As the level of Wing-Stay 100 increased, the kinetic ozone and weather resistance showed notably more improvement than did static weather resistance. (See Figure 22.)

As in SBR 1500C, the amount of the antiozonant used for stabilizing SBR 1712C was found to be available for weather protection. A reduced amount of the antiozonant could be added during compounding to this C polymer for equal weather resistance in the vulcanizate. (See Figures 19-21, 23.)

The comparison of antiozonants in SBR 1712 was carried out at a 2.5 phr. level. (See Table 7 and Figures 24-28.) In kinetic ozone and weather protection be-

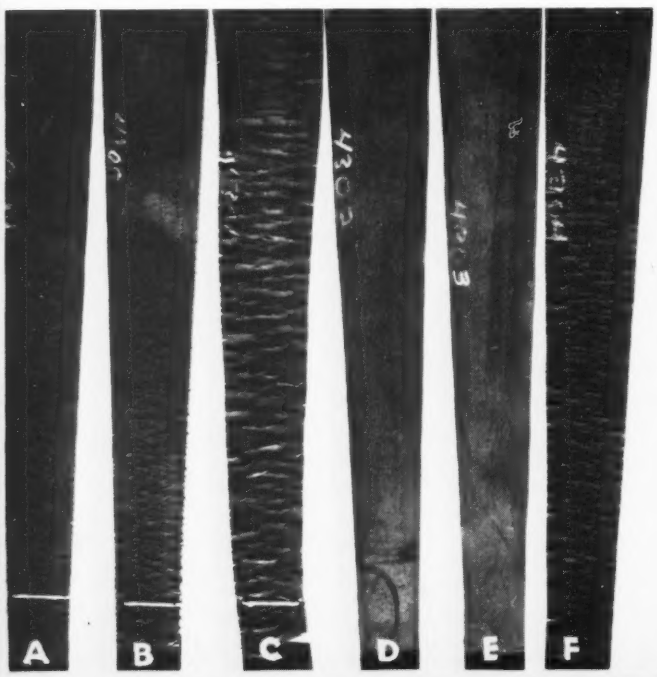


Fig. 17. Samples exposed for static weathering at Los Angeles for 113 days from June through October. Samples protected by 2 phr. of antiozonant in SBR 1500 compounds. Antiozonants used were *(left to right)* Wing-Stay 100, EDT mq, DT mq, Dmh-pPD, DO-pPD, and PBNA

Fig. 12. Weathering index for various antiozonants in SBR 1500 compound tested in ozone chamber in kinetic test unaged and heat aged

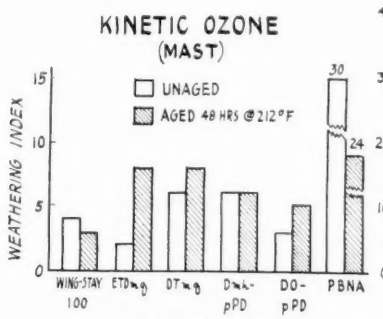


Fig. 13. Outdoor kinetic test at Akron on SBR 1500 compounds containing various antiozonants

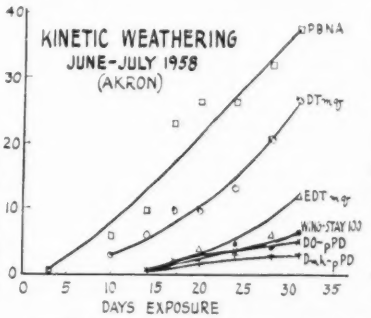
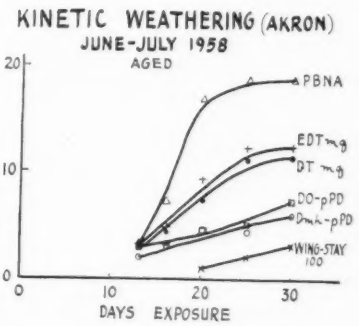
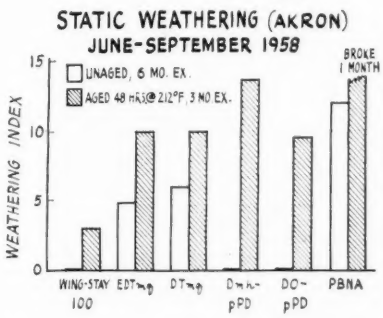
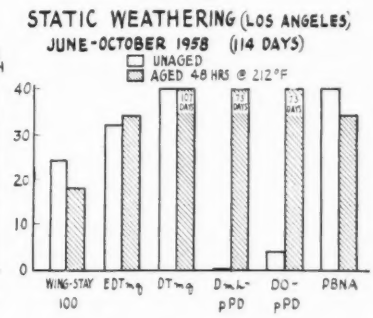


Fig. 14. Outdoor kinetic test at Akron on oven aged samples of SBR 1500 compounds containing various antiozonants







(Far left)

Fig. 15. Outdoor static test at Akron on SBR 1500 compounds containing various antiozonants

(Left)

Fig. 16. Outdoor static test at Los Angeles on the SBR 1500 compounds

fore aging, Wing-Stay 100 was in a class with EDT mq, but was outperformed by the dialkyl-p-phenylenediamines, DO-pPD and Dmh-pPD. (See Figures 24 and 25.) After aging two days at 212° F., however, Wing-Stay 100 demonstrated its greater persistence over the dialkyl-p-phenylenediamines as well as over the dihydroquinolines. (See Figure 26.)

Tire Performance and Significance of Tests

Comparison of the tire photographs (Figures 3 and 5) suggests that the most severe cracking in the Los Angeles area was static in origin and circumferential in direction. In the tire run on a private car a somewhat finer pattern of kinetic cracking was superimposed and appears to be either radial or biaxial in direction.

Persistence, an outstanding quality of Wing-Stay 100 which was shown in laboratory tests, was demonstrated to be an important factor in effective antiozonant protection in tires after the first year. At the end of 12-15 months, this material was still functioning; while the active, but relatively fugitive DO-pPD appeared to have been almost completely dissipated.

Processing Characteristics

Wing-Stay 100 had little activating effect on the curing ingredients used in the various stocks in this study; while the EDT mq and the dialkyl-p-phenylenediamines caused considerable activation in certain cases.

This fact is evident upon examination of the scorch data, particularly as obtained from the Ordnance formulation (Table 3). In this stock with the Dmh-pPD and EDT mq combination, a five-point rise in Mooney was noted in 32 minutes at 250° F. When these antiozonants were replaced by 3 or 4 parts of Wing-Stay 100, however, scorch times of 55 and 57 minutes were obtained under the same conditions. As a result, it can be predicted that less difficulty in factory processing will be enountered with stocks containing this antiozonant.



Fig. 18. Conditions identical to those in Fig. 17 except that samples were oven aged prior to exposure

Fig. 19. Kinetic test on SBR 1712 and SBR 1712C compounds in ozone box to determine effective level of Wing-Stay 100 in these polymers

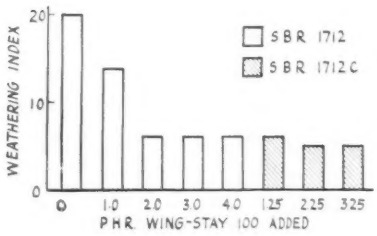


Fig. 20. Static weathering test in Akron for effective level determination of Wing-Stay 100 in SBR 1712-type polymer compounds

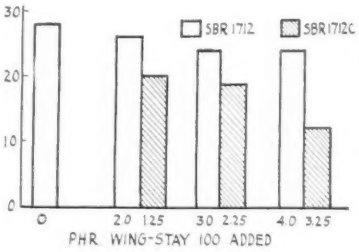
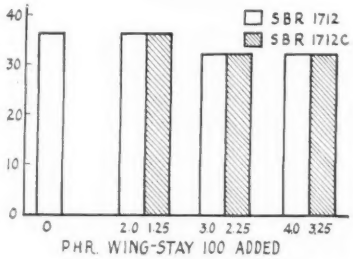
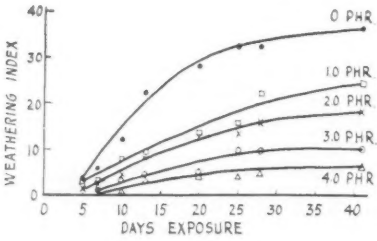
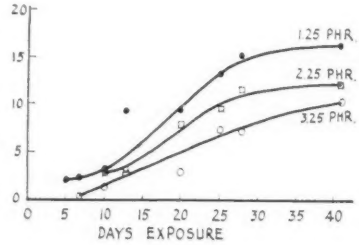


Fig. 21. Static weathering test in Los Angeles on same compounds as in Fig. 20







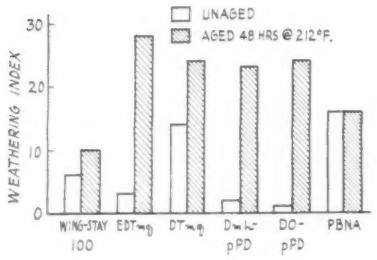
(Far left)
Fig. 22. Outdoor kinetic test in Akron on SBR 1712 compounds for effective level determination

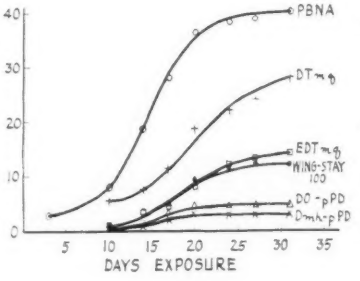
(Left)
Fig. 23. Outdoor kinetic test in Akron on SBR 1712C compounds for effective level determination

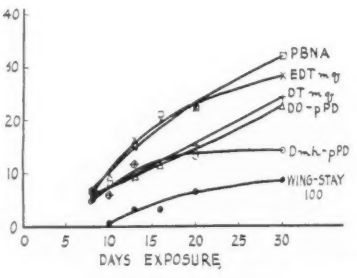
Fig. 24. Comparative evaluation of antiozonants in SBR 1712 compounds in kinetic test in ozone box

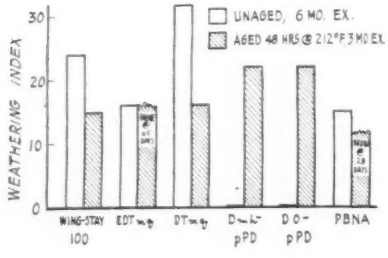
Fig. 25. Comparative evaluation of antiozonants in SBR 1712 compounds in kinetic test outdoors at Akron

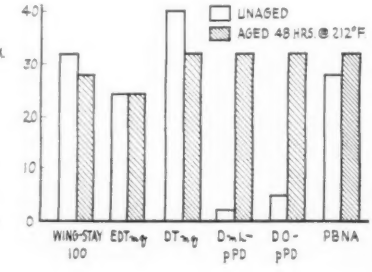
Fig. 26. Weathering index on samples aged in oven prior to exposure, then run in outdoor kinetic test at Akron











(Far left)
Fig. 27. Static weathering in Akron on SBR 1712 compounds containing various antiozonants

(Left)
Fig. 28. Static weathering in Los Angeles on SBR 1712 compounds containing the various antiozonants

Summary and Conclusions

The mixture of diaryl-p-phenylenediamines, Wing-Stay 100, has been evaluated as an antiozonant in SBR vulcanizates. Both laboratory and tire tests reveal that this chemical is an antiozonant of outstanding persistence in such vulcanizates.

When this antiozonant was compared to representative dihydroquinolines and dialkyl-p-phenylenediamines in stocks which were oven aged before exposure to weather or ozone, its persistence was clearly shown. Substitution of Wing-Stay 100 for the antiozonants used in the Ordnance standard Ozone Resistant Stock substantiated these findings. The persistence of this antiozonant is attributed to its low volatility and low

(Continued on page 146)

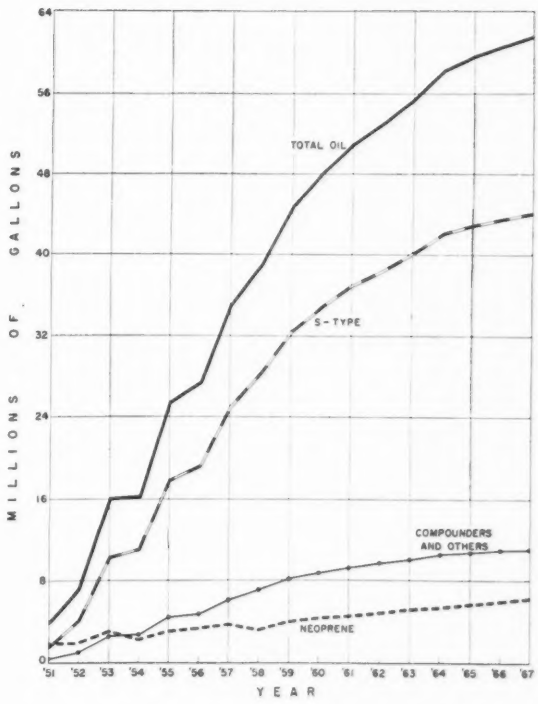
Use of Rubber Processing Oils In the United States, 1951-1967

THE purpose of this study is to determine and analyze insofar as possible the market for rubber processing oils, past, present, and future, in the synthetic rubber producing and rubber goods fabricating industries in the United States. Until 1951 when the commercial development of oil-extended styrene-butadiene rubber (SBR) began, the major use of rubber processing oils was in the rubber goods plants. Since that time the use of rubber processing oils has grown from about 4,000,000 gallons a year to more than 10 times that amount, with about 73% of this total to be used this year in extending SBR. Obviously, an estimate of the future market for rubber processing oils in light of the steadily increasing rubber consumption in this country should have considerable significance.

TABLE 1. PRODUCTION OF SYNTHETIC RUBBER BY COMPANIES BY TYPE, 1957*

Type of Synthetic	Company	Long Tons		%
SBR	Goodrich-Gulf Chemicals, Inc.	121,409		11.8
	Firestone Tire & Rubber Co.	169,472		16.4
	American Synthetic Rubber Corp.	35,364		3.4
	Copolymer Rubber & Chemical Corp.	60,249		5.8
	Goodyear Synthetic Rubber Corp.	186,340		18.1
	Texas-U.S. Chemical Corp.	56,976		5.5
	Shell Chemical Corp.	61,933		6.0
	Phillips Chemical Co.	66,840		6.5
	United States Rubber Co.	21,943		2.1
	General Tire & Rubber Co.	2,917		0.3
	United Rubber & Chemical Co.	36,658		3.6
	All Other	795		0.1
	Total		820,896	79.6
Butyl	Standard Oil Co of N. J.	—		
	Humble Oil & Refining Co.	—		
	Total		66,936	6.5
Neoprene	E. I. du Pont de Nemours & Co., Inc.	110,721		
	Total		110,721	10.7
Nitrile	B. F. Goodrich Chemical Co.	—		
	Goodyear Tire & Rubber Co.	—		
	United States Rubber Co.	—		
	Firestone Tire & Rubber Co.	—		
	International Latex Corp.	—		
	Total		32,982	3.2
	Total Synthetic Rubber Produced		1,031,535	100.0

*Excludes oil and black.



Actual and estimated market for processing oil in the rubber industry, 1951-1967

Major Oil Use in SBR Manufacture

During 1957 the United States synthetic rubber producing industry produced 1,031,535 long tons of general- and special-purpose synthetic rubbers. Table 1 lists the type and the quantity of synthetic rubber produced in that year, with the amount produced by individual companies detailed for SBR. In this table, attention is called to the fact that 79.6% of the output was SBR; 10.7% was neoprene; 6.5% was butyl rubber; and the remaining 3.2% was nitrile rubber.

In arriving at estimates of the demand for rubber processing oils for a 10-year period beyond 1957, an average rate of growth in the demand for rubber in

TABLE 2. PRODUCTION OF SBR BY CATEGORIES, BY COMPANY, 1957*

Company	Regular SBR		Cold SBR		Cold Oil Masterbatch		Cold and Regular Black Masterbatch		Cold Oil-Black Masterbatch		Total SBR	
	%	Long Tons	%	Long Tons	%	Long Tons	%	Long Tons	%	Long Tons	%	Long Tons
Goodrich-Gulf Chemicals, Inc.	17.5	27,816	21.7	79,117	6.0	14,398	0.2	78	—	—	14.8	121,409
Firestone Tire & Rubber Co.	32.5	51,658	17.9	65,262	21.9	52,552	—	—	—	—	20.7	169,472
American Synthetic Rubber Corp.	4.0	6,358	7.1	25,886	1.3	3,120	—	—	—	—	4.3	35,364
Copolymer Rubber & Chemical Corp.	—	—	13.3	48,491	4.9	11,758	—	—	—	—	7.3	60,249
Goodyear Synthetic Rubber Corp.	17.0	27,021	17.7	64,533	39.5	94,786	—	—	—	—	22.7	186,340
Texas-U. S. Chemical Corp.	8.1	12,875	6.8	24,792	7.9	18,957	0.9	352	—	—	6.9	56,976
Shell Chemical Corp.	6.0	9,537	6.2	22,605	10.0	23,997	11.4	4,461	7.3	1,333	7.5	61,933
Phillips Chemical Co.	6.1	9,696	6.1	22,240	8.5	20,397	26.9	10,527	21.8	3,980	8.1	66,840
United States Rubber Co. (Naugatuck)	8.3	13,193	2.4	8,750	—	—	—	—	—	—	2.7	21,943
General Tire & Rubber Co.	—	—	0.8	2,917	—	—	—	—	—	—	0.4	2,917
United Rubber & Chemical Co.	—	—	—	—	—	—	60.6	23,714	70.9	12,944	4.5	36,658
All Other	0.5	795	—	—	—	—	—	—	—	—	0.1	795
Total	100.0	158,949	100.0	364,593	100.0	239,965	100.0	39,132	100.0	18,257	100.0	820,899

*Excludes oil and black.
SOURCE: Third Report of the Attorney General on "Competition in Synthetic Rubber Industry," July 1, 1958.

the U.S.A. of 3.3% was used, and it was assumed that SBR will account for the major part of this growth rate. The production and the use of rubber outside the United States, particularly synthetic, were examined also in order to adjust estimates of U. S. synthetic rubber production in accordance with the growing output abroad, which latter will reduce somewhat U. S. production for export.

Actually, SBR accounts for about 80% of the synthetic rubber produced and 50% or more of the consumption of total new rubber in the United States. Between 25 and 50 parts of oil are used on 100 parts of SBR in making the oil and oil-black masterbatches. Producing companies have improved their technology since 1956 to the point where, today, oil usage is approaching the upper limits of this oil proportion.

Oil potential figures for SBR were derived by applying a loading factor to the oil and oil-black masterbatch production data given in Table 2 for the producing companies. Table 3 lists the amounts of oil and oil-black masterbatches made by the several producers in 1957 and shows the percentage of total output for each producer together with an estimate of the amount of oil that was added to the rubber in these masterbatches (all rubber figures in Tables 1-3 are on a net polymer, without oil or black, basis). Goodyear Synthetic Rubber Corp. ranked first in the production of these masterbatches in that year, followed by Firestone Tire & Rubber Co., Shell Chemical Corp., and Phillips Chemical Co.

Rubber processing oils may be classified by carbon-type composition according to viscosity gravity constants[1] to include the following types: (1) paraffinic; (2) relatively paraffinic; (3) naphthenic; (4) relatively aromatic; (5) aromatic; (6) very aromatic; (7) extremely aromatic.

In this study it was possible only to approximate these VGC classifications and to indicate the types of oil consumed by the SBR industry in two classifications, naphthenic and aromatic. The composition of the oils appears to influence the characteristics of the masterbatches with regard to processing into finished products. Masterbatches containing highly aromatic oils tend to process better than those containing naphthenic oils, but naphthenic oils have better resistance to staining and discoloration than the highly aromatic oils.

Table 4 shows the total oil and oil-black masterbatch made by the several producers in 1957, with the amount of naphthenic or aromatic oil used. The column on the extreme right in Table 4 adds up the net polymer and the oil used to give the gross weight of these masterbatches.

During the past several years general-purpose synthetic polyisoprene and polybutadiene have been developed for competition with natural rubber. These rubbers are relatively high priced when compared with the present price of SBR, but their extension with oil to reduce this price is not considered to be beyond the realm of possibility, thus opening up a further market for extending oils.

Use in Neoprene, Butyl, Nitrile Rubbers

Neoprene synthetic rubber, which accounted for 10.7% of the 1957 synthetic rubber production was

[1]S. S. Kurtz, Jr., R. W. King, J. S. Sweely, *Ind. Eng. Chem.*, 48, 2232 (1956).

TABLE 3. PRODUCTION OF OIL-EXTENDED SBR BY COMPANY, 1957

(Long Tons)

Company	Oil* Black Masterbatch Cold	Oil* Masterbatch Cold	Total* Oil and Oil Black Masterbatch	% of Total Oil and Black Masterbatch	Estimated Oil Added to SBR Polymer
American Synthetic Rubber Corp.	—	3,120	3,120	1.2	1,073
Copolymer Rubber & Chemical Corp.	—	11,758	11,758	4.6	4,113
Firestone Tire and Rubber Co.	—	52,552	52,552	20.4	18,240
Goodrich-Gulf Chemicals, Inc.	—	14,398	14,398	5.6	5,007
Goodyear Synthetic Rubber Corp.	—	94,786	94,786	36.7	32,814
Phillips Chemical Co.	3,980	20,397	24,377	9.4	8,405
Shell Chemical Corp.	1,333	23,997	25,330	9.8	8,762
Texas-U.S. Chemical Corp.	—	18,957	18,957	7.3	6,527
United States Rubber & Chemical Co.	12,944	—	12,944	5.0	4,470
Total	18,257	239,965	258,222	100.0	89,411

*Excludes oil and black.

TABLE 4. TYPES OF OIL USED IN SBR PRODUCTION, BY COMPANIES, 1957

(Long Tons)

Company	Naphthenic Oil-Extended Rubber		Aromatic Oil-Extended Rubber		Gross Weight Oil-Extended SBR
	Net Polymer	Oil Content	Net Polymer	Oil Content	
American Synthetic Rubber Corp.	3,120	1,197	—	—	4,317
Copolymer Rubber & Chemical Corp.	—	—	11,758	4,113	15,871
Firestone Tire & Rubber Co.	812	312	51,740	17,928	70,792
Goodrich-Gulf Chemicals, Inc.	3,753	1,441	10,645	3,556	19,395
Goodyear Synthetic Rubber Corp.	2,297	882	92,489	31,932	127,600
Phillips Chemical Co.	5,299	2,035	19,078	6,370	32,782
Shell Chemical Corp.	151	58	25,179	8,704	34,092
Texas-U. S. Chemical Co.	2,794	1,073	16,163	5,454	25,484
United Rubber & Chemical Co.	5,052	1,940	7,892	2,530	17,414
Total	23,278	8,938	234,944	80,587	347,747

and is manufactured only by E. I. du Pont de Nemours & Co., Inc. To date, Du Pont and oil company technicians have not found a method for extending the base polymer with oil during the manufacturing process without the necessity of constructing a large plant costing approximately $2 million. There is a possibility, however, that research under way at the present time might create a new market for rubber processing oils at the neoprene manufacturing level. At present rubber processing oils are added only in the rubber goods plants as a part of the compounding operation for the manufacture of the many industrial rubber products for which neoprene is used.

The neoprene oil potential is found from its use in the above-mentioned compounding operations which consumed 3,865,600 gallons of rubber processing oils in 1957. Two average use ratios were employed to estimate the total amounts of oil consumed with neoprene: (1) for 90% of the neoprene used, 10 parts of oil on 100 parts of neoprene; (2) for 10% of the neoprene used, 75 parts of oil on 100 parts of neoprene.

Butyl rubber is manufactured only by the Standard Oil Co. of N. J. and its subsidiary, Humble Oil & Refining Co. Butyl rubber accounted for 6.5% of the total synthetic production in 1957. It is not extended in the manufacturing process, but process oil is used in compounding for the production of many industrial rubber products and for tires and tubes. About 10-12 parts on 100 of rubber are used in compounding for the production of tires and 15-20 phr. are used in compounding for tubes and industrial rubber products. This oil use is included in that attributed to "compounders" in the "tires and tubes" and "others" category in Table 5.

With the development of butyl truck tires, which were accepted by Army Ordnance in 1957, the marketing of passenger-car tires which began in 1959, and the considerable growth in the use of butyl rubber for many industrial rubber products, butyl rubber consumption is expected to grow at a steady rate and therefore is another growing market for processing oils.

Butadiene-acrylonitrile or nitrile rubbers are oil-resistant rubbers, and no extension is possible or desirable in the process of their manufacture. Only very small amounts of oil may be used in connection with the compounding of nitrile rubber cements and adhesives.

Use in Tires, Tubes, and Other Rubber Goods

The oil used in compounding SBR and natural rubber in the production of tires and tubes and other rubber products was arrived at in the following manner. The oil used for extending SBR in the synthetic rubber plants for 1958 and beyond is expected to remain at 73% of the total oil used by the rubber industry, even though the volume will increase yearly. The amount of oil used for extending SBR was extrapolated to 100% to arrive at total oil used for

TABLE 5. ESTIMATED MARKET POTENTIAL FOR RUBBER PROCESSING OILS BY YEARS, 1951-1967

	In Gallons						% of Total					
		Compounders						Compounders				
Year	SBR	Neoprene	Tires & Tubes	Others	Total	Grand Total	SBR	Neoprene	Tires & Tubes	Others	Total	Grand Total
1951	1,595,100	2,056,600	199,400	199,400	2,455,400	4,050,500	39.4	50.8	4.9	4.9	60.6	100.0
1952	4,221,300	2,151,500	527,500	527,800	3,206,800	7,428,100	56.8	29.0	7.1	7.1	43.2	100.0
1953	10,296,200	3,220,000	1,287,100	1,286,900	5,794,000	16,090,200	64.0	20.0	8.0	8.0	36.0	100.0
1954	11,082,400	2,414,200	1,385,200	1,385,400	5,184,800	16,267,200	68.1	14.9	8.5	8.5	31.9	100.0
1955	17,853,100	3,188,900	2,231,600	2,231,600	7,652,100	25,505,200	70.0	12.5	8.8	8.7	30.0	100.0
1956	19,171,300	3,470,300	2,396,500	2,396,300	8,263,100	27,434,400	69.9	12.7	8.7	8.7	30.1	100.0
1957	25,035,100	3,865,600	3,129,400	3,129,400	10,124,400	35,159,500	71.2	11.0	8.9	8.9	28.8	100.0
1958	28,448,800	3,413,800	3,556,100	3,556,100	10,526,000	38,974,800	73.0	8.8	9.1	9.1	27.0	100.0
1959	32,500,000	4,195,000	4,062,500	4,062,500	12,320,000	44,820,000	72.5	9.3	9.1	9.1	27.5	100.0
1960	35,000,000	4,466,000	4,375,000	4,375,000	13,216,000	48,216,000	72.6	9.3	9.1	9.0	27.4	100.0
1961	37,000,000	4,737,100	4,625,000	4,625,000	13,987,100	50,987,100	72.6	9.2	9.1	9.1	27.4	100.0
1962	38,500,000	5,008,100	4,812,500	4,812,500	14,633,100	53,133,100	72.5	9.4	9.1	9.0	27.5	100.0
1963	40,200,000	5,279,100	5,025,000	5,025,000	15,329,100	55,529,100	72.4	9.5	9.1	9.0	27.6	100.0
1964	42,200,000	5,550,400	5,275,000	5,275,000	16,100,400	58,300,400	72.4	9.5	9.1	9.0	27.6	100.0
1965	43,000,000	5,821,200	5,375,000	5,375,000	16,571,200	59,571,200	72.2	9.8	9.0	9.0	27.8	100.0
1966	43,600,000	6,092,500	5,450,000	5,450,000	16,992,500	60,592,500	72.0	10.0	9.0	9.0	28.0	100.0
1967	44,200,000	6,363,600	5,525,000	5,525,000	17,413,600	61,613,600	71.7	10.3	9.0	9.0	28.3	100.0

all purposes for 1958 and succeeding years. From this total the amount used in compounding neoprene and butyl rubbers was subtracted, and the remainder was the amount estimated for use in compounding SBR, natural rubber, etc. in tires and tubes and other rubber products.

For the period 1951 through 1954, the amount of oil used for extending SBR was available from government statistics; the amount used for compounding neoprene and for compounding butyl and other rubbers in tires and tubes and other rubber products was determined by surveys. For the period 1955-57, both this method and the extrapolation method were used.

Estimated Use Through 1967

The actual and estimated potential market for rubber processing oils for the years 1951-1967 is given in Table 5 according to the major industry groups as indicated. In 1958 it was estimated that a total of 38,974,800 gallons was used for all purposes, of which about 28 million gallons, or 73% was used by the producers of SBR. Compounders and fabricators of rubber products shared the remaining 27% of the market. Oil is used by compounders to aid in processing the polymer, to improve the physical properties of natural and synthetic polymers, and to extend the more expensive polymers. Generally, additional oil is used even in compounding for rubber products made from oil-extended SBR. While the amount used in all areas will increase through 1967, the distribution by end-use will remain relatively constant.

Table 5 indicates that oil consumption by SBR manufacturers will climb to 44,200,000 gallons in 1967, an increase of about 55% over 1958 use. Oil used in compounding for rubber products will increase about 65% to 17,413,600 gallons, thus making estimated total consumption for all purposes in 1967 equal to 61,613,600 gallons, an increase of 58% over 1958 consumption. It is not possible to estimate the relative amounts of the different types of oils, that is, naphthenic, aromatic, etc., that will be used.

Acknowledgment

The material in this study is a joint effort of Edward Bloom and William Perbetsky, statistical research department, Sun Oil Co., Philadelphia, Pa. Various books, articles, government and trade association reports were used as source material in its preparation, the most important of which were probably the First, Second, and Third Reports of the United States Attorney General on "Competition in the Synthetic Rubber Industry," which were published in 1956, 1957, and 1958, respectively. Unpublished information from several major rubber fabricating and synthetic rubber producing companies was used also in preparing this study. Comments and suggestions in connection with this survey will be appreciated.

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AMA Reports on R & D Budgets

According to the latest survey of the American Management Association, research and development budgets of 600 U. S. corporations were 12% higher in 1959 than in 1958. The rubber industry in 1958 topped all other groups with a research and development budget amounting to 9.3% of industry sales, it was reported.

MEETINGS and REPORTS

IRC Conference Final Program

The International Rubber Conference, sponsored jointly by the American Chemical Society, Division of Rubber Chemistry; the American Society for Testing Materials, Committee D-11 on Rubber and Rubber-Like Materials; and the American Society of Mechanical Engineers, Rubber & Plastics Division, has finalized its program for this meeting to be held at the Shoreham and Sheraton-Park hotels in Washington, D. C., November 9-13. The earlier published program was revised because of necessary adjustments in the grouping of papers to provide a more unified whole.

The 12 technical sessions of the Conference begin on the morning of November 9 and continue through the afternoon of November 13. There will be an Introduction to the Conference at the first session on November 9 by Wallace R. Brode, U. S. State Department science advisor. The first session will deal with equipment and processes for rubber goods manufacturing and will be followed by two sessions and part of a third on tires. Other sessions or parts of sessions deal with advances in test methods, natural rubber and latex, elastomer reinforcement, polymers and polymer structure, vulcanization, and many other subjects of primary interest, as will be seen from the detailed program which follows.

The administrative committee for the Conference is headed by A. E. Juve, B. F. Goodrich Co. Research Center. The program committee is headed by B. S. Garvey, Jr., Pennsalt Chemicals Corp., and the local committee by A. W. Sloan, Atlantic Research Corp.

The special feature of the ACS Rubber Division, that is, the Charles Goodyear Medal Lecture, will occur on the morning of November 11. The Lecture is entitled "People and the Banbury Mixer," by F. H. Banbury, retired. The actual Medal Award presentation will take place at the Conference banquet on the evening of November 12. This banquet will also have as a speaker a leading figure from the national Administration. It will be held at the Sheraton-Park Hotel and will be preceded by the suppliers' party.

The other special Rubber Division, ACS, feature, the luncheon meeting of the Division's 25-Year Club is being held at noon on November 11. C. A. Bartle, E. I. du Pont de Nemours & Co., Inc., is chairman for the Washington meeting of the Club, and he is inviting all registrants from abroad to attend this meeting.

There will be Conference tours on the afternoon of November 10. One such tour will be to the National Bureau of Standards; the other will include visits to the Bureau of Engraving and Printing, the Federal Bureau of Investigation, and National Archives, all three places of interest being included in the second tour.

There will be an extensive ladies' program consisting of tours about and to places of interest in Washington, including the White House, and on November 12 there will be a luncheon and style show.

The finally revised program which follows has some changes in the numbers of the papers as given for abstracts published in previous issues. The numbers for the remaining abstracts which are also presented following the detailed program are in accordance with the revised program.

International Rubber Conference Technical Program

Session No. 1—Monday Morning, November 9

R. D. Stiehler, Chairman

9:00 a.m. 1. Introduction to the Conference, Wallace R. Brode, U. S. State Department, Washington, D. C.

Equipment and Processes in Rubber Manufacturing

9:15 a.m. 2. The Rotomil—A Continuous Mixing Device. A. E. Juve, J. R. Beatty, Goodrich Research Center, Brecksville, O., and R. H. Kline, National Rubber Machinery Co., Akron, O.

9:40 a.m. 3. New Rubber Processing Techniques for the '60's. A. H. Hale, Hale & Kullgren, Inc., Akron.

10:20 a.m. 4. Basic Equipment for Producing Flexible and Rigid Polyurethane Foams. J. M. Buist, Imperial Chemical Industries, Ltd., Manchester, England.

Elastomers as Engineering Materials

10:45 a.m. 5. Urethane Polymers as Engineering Materials. J. G. DiPinto and S. D. McCready, E. I. duPont de Nemours & Co., Inc., Wilmington, Del.

Tires

11:10 a.m. 6. Worldwide Developments in Tire Production. C. A. Litzler, C. A. Litzler Co., Cleveland, O.

Session No. 2—Monday Afternoon, November 9

R. G. Seaman, Chairman

Tires

2:00 p.m. 7. What Bladderless Curing of Tubeless Tires Can Mean in Increased Productivity. George N. Murphy, National Rubber Machinery Co., Akron, O.

2:25 p.m. 8. Construction and Performance of All-Butyl Passenger Tires. J. L. Ernst and S. R. Shuart, Enjay Laboratories, Linden, N. J.

2:50 p.m. 9. The Mechanical Behavior of the Tire in Dependence on Materials and Construction. W. Hofferberth, Deutsche Dunlop Gummi Co. AG., Hanau a. Main, Germany.

3:20 p.m. 10. Stresses in Deflected Tires. W. F. Ames and H. G. Lauterbach, Du Pont.

3:45 p.m. 11. Power Wastage in Tires. G. B. Roberts, Dunlop Rubber Co., Ltd., Birmingham, England.

4:10 p.m. 12. Power Loss and Operating Temperature of Tires. R. D. Stiehler, M. N. Steel, G. G. Richey, J. Mandel, R. N. Hobbs, National Bureau of Standards, Washington.

Session No. 3—Tuesday Morning, November 10

S. Collier, Chairman

Tires

9:00 a.m. 13. Optimal Conditions for Retreading of Tires. H. Geldof, Rubberinstituut T. N. O., Delft, Netherlands.

9:25 a.m. 14. Aircraft Tire Testing Developments. H. P. Lamb, Adamson United Co., Akron.

9:50 a.m. 15. A Towing Device for Estimating Road Wear. L. P. Gelinas and E. B. Storey, Polymer Corp., Ltd., Sarnia, Ont., Canada.

10:15 a.m. 16. An Indoor Tester for Measuring Tire Treadwear. G. G. Richey, J. Mandel, and R. D. Stiehler, National Bureau of Standards.

10:40 a.m. 17. International Road Testing of HAF and ISAF Blacks in Passenger Tires. O. F. K. Bussemaker, N. V. Ruberfabriek Vredestein, Enschede, Netherlands; E. M. Dannenberg, Godfrey L. Cabot, Inc., Cambridge, Mass.; C. Prat, Institut Français

du Caoutchouc, Paris, France; H. Westlinning, Degussa A. G., Kalscheuren, Germany.

11:10 a.m. 18. Measurement of Tread Motion and Application to Tire Performance. H. H. Vickers and S. B. Robison, Esso Research & Engineering Co., Linden, N. J.

Session No. 4—Wednesday Morning, November 11

H. G. Bimmerman, Chairman

Tires

9:00 a.m. 19. The Role of Hysteresis in Tire Wear and Laboratory Abrasion. A. Schallamach, British Rubber Producers Research Association, Welwyn Garden City, England.

9:30 a.m. 20. A Theory of the Abrasion of Rubber. F. W. Boggs, U. S. Rubber Co., Wayne, N. J.

Advances in Test Methods

10:00 a.m. 21. Micro-Hardness and Micro-Rebound Measurements. S. Oberto (to be presented by a colleague), Pirelli Rubber Laboratories, Milan, Italy.

10:15 a.m. 22. Micro-Hardness Testing—Its Possibilities and Limitations. A. L. Soden and J. R. Scott, Research Association of British Rubber Manufacturers, Shawbury, England.

10:40 a.m. 23. The Stress-Strain Behavior of Elastomers at Different Velocities of Deformation. G. Fromandi, R. Ecker, W. Heidemann, Farbenfabriken Bayer A. G., Leverkusen, Germany.

Session No. 5—Wednesday Morning, November 11

E. H. Krismann, Chairman

Aging

9:00 a.m. 24. A Study of the Behavior of Selected Derivatives of p-Phenylene Diamine in Rubber Compounds. E. R. Thornley and J. T. Watts, Imperial Chemical Industries.

9:20 a.m. 25. New Artificial Weathering Methods. G. F. Bush, G. F. Bush Associates, Princeton, N. J.

9:40 a.m. 26. The Natural and Accelerated Ozone Aging of Elastomer Compounds. M. M. Lowman, Goodyear Tire & Rubber Co., St. Marys, O., and H. P. Miller, Cadillac, Inc., Cadillac, Mich.

10:10 a.m. 27. Measurement of the Aging of Rubber Vulcanizates. J. Mandel, F. L. Roth, M. N. Steel, and R. D. Stiehler, NBS.

Sealants

10:35 a.m. 28. Effect of Composition on Flow Properties of Polymeric Sealants. J. Gaynor, G. W. Blum, E. G. Babolek, C. P. Alexander, Case Institute of Technology, Cleveland, O.

11:50 a.m. 29. The Charles Goodyear Medal Lecture of the Division of Rubber Chemistry, American Chemical Society—People and the Banbury Mixer. F. H. Banbury, Medalist.

11:10 a.m. Business Meeting. Rubber Division, ACS.

Noon. 25-Year Club Luncheon. Rubber Division, ACS. C. A. Bartle, Chairman.

Session No. 6—Wednesday Afternoon, November 11

J. J. Allen, Chairman

Advances in Test Methods

2:00 p.m. 30. Standard Materials for Rubber Compounding. F. L. Roth and R. D. Stiehler, NBS.

2:20 p.m. 31. Sulfur Group Analyses in Natural Rubber Vulcanizates. M. L. Studebaker and L. G. Nabors, Phillips Chemical Co., Akron.

Classification of Compounds

2:40 p.m. 32. A Practical Method of Classifying All Elastomeric Vulcanizates. N. L. Catton, Du Pont, and R. C. Edwards, Chrysler Engineering Corp., Detroit, Mich., and T. M. Loring, Michigan Precision Molded, Inc., Walled Lake, Mich.

Statistical Methods

3:20 p.m. 33. The Use of Regression Techniques in Elastomer Compounding. P. F. Bertsch, Du Pont.

3:50 p.m. 34. Putting Quality Control to Work. S. Collier, Johns-Manville Corp., New York, N. Y.

Session No. 7—Thursday Morning, November 12

A. W. Sloan, Chairman

Natural Rubber and Latex

9:00 a.m. 35. Preservation of Natural Rubber Field Latex. J. S. Lowe, Dunlop Malayan Estates, Ltd., Batang, Malaka, Malaya.

9:25 a.m. 36. Modern Large-Scale Production of *Hevea* Rubber. G. Verhaar, Firestone Plantations Co., Harbel, Liberia.

9:50 a.m. 37. Recent Developments in the Production and Processing of Natural Rubber in Malaya. J. E. Morris and B. C. Sekhar, Rubber Research Institute of Malaya, Kuala Lumpur, Malaya.

10:15 a.m. 38. Toward the Standardization of Natural Rubber. M. Liponski, J. d'Auzac, and Vu-Dinh-Do, Institut des Recherches sur le Caoutchouc au Viet-Nam.

10:40 a.m. 39. How Physiology Improves the Yield of the *Hevea* Tree. J. LeBras, Institut Français du Caoutchouc.

11:05 a.m. 40. Zinc Oxide Stability Testing of Natural and Synthetic Latices. J. L. M. Newnham and D. J. Simcox, Dunlop Rubber Co., Ltd., Birmingham.

11:30 a.m. 41. A Strain Test for Latex Films and Its Application. P. R. Gyss and C. E. Wu, Socfin Co., Ltd., Kuala Lumpur.

Session No. 8—Thursday Morning, November 12

J. H. Ingmanson, Chairman

Theory

9:00 a.m. 42. Measurement and Interpretation of the Rate of Volume Swell and Equilibrium Volume Swell in Cross-Linked Networks. D. J. Buckley and M. Berger, Esso Research & Engineering Co.

9:30 a.m. 43. Longitudinal Tear of Stretched Vulcanizates—II. Tests of Various Elastomers in a Limited Range of Temperature and Rate of Tearing. R. Chasset and P. Thirion, Institut Français.

10:00 a.m. 44. Viscosity and Relaxation Measurements on Crude Rubbers and Compounds. S. Eccher, Pirelli Rubber Laboratories.

10:20 a.m. 45. The Measurement of Flow and Slip Velocity with the Shearing Disk Viscometer. M. Mooney, United States Rubber, Wayne, N. J.

10:45 a.m. 46. Response of an Elastomer to Any Forcing Function. M. Berger, Esso Research.

11:10 a.m. 47. Some Statistical Considerations Underlying Molecular Theories of Rubber Elasticity. Jacob Mazur and Turner Alfrey, Jr., Dow Chemical Co., Midland, Mich.

Session No. 9—Thursday Afternoon November 12

B. S. Garvey, Jr., Chairman

Elastomer Reinforcement

2:00 p.m. 48. Reinforcement of Rubber by Fillers: Tear Resistance. L. Mullins, BRPRA.

2:30 p.m. 49. Elastomer-Filler Interactions. J. P. Berry, P. J. Cayre, and M. Morton, University of Akron, Akron.

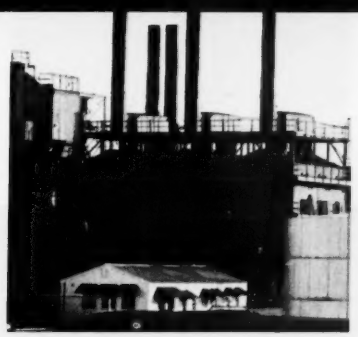
2:55 p.m. 50. Interactions of Hydrocarbons and Powders. W. C. Wake, RABRM.

3:20 p.m. 51. Mechanico-Chemical Reactions Leading to Reinforcement in Rubbers. R. J. Ceresa, National College of Rubber Technology, London, England.

3:45 p.m. 52. Oxidation of *Hevea* Vulcanizates Containing Carbon Black. E. M. Bevilacqua, U. S. Rubber, Wayne.

4:05 p.m. 53. Swell Resistance of Polymer Filler Systems to Boiling Water. S. Palinchak and W. J. Mueller, Battelle Memorial Institute, Columbus, O.

4:25 p.m. 54. Non-Discoloring Oils for Processing and Extending Rubber. J. S. Sweeley, J. B. Ziegler, P. E. Oberdorfer, R. W. King, S. S. Kurtz, Jr., all of Sun Oil Co., Marcus Hook, Pa.



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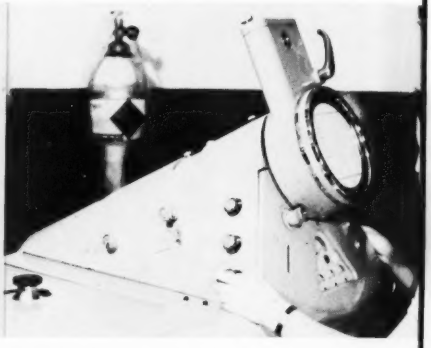
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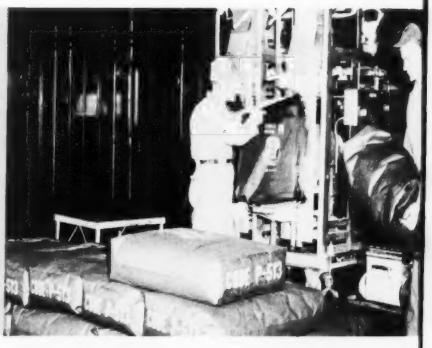
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Session No. 10—Thursday Afternoon, November 12

W. J. Sparks, Chairman

Adhesion

2:00 p.m. 55. Aspects of Rubber-Textile Adhesion. G. M. Doyle, Dunlop Rubber Co., Ltd.

Synthetic Rubber Latex

2:25 p.m. 56. Factors Influencing the Stability of SBR Latex. F. A. Sliemers, B. Bennett, P. B. Stickney, G. Heiligmann, Battelle Memorial Institute; H. K. J. de Decker, Texas-U.S. Research Center, Parsippany, N. J.

2:55 p.m. 57. The Colloidal Properties of Synthetic Copolymer Latices. C. F. Fryling and E. M. Gindler, Koppers Co., Inc., Verona, Pa.

Latex Modified Rubber

3:25 p.m. 58. Developments in Superior Processing Natural Rubber. H. C. Baker and R. M. Foden, BRPBA.

3:55 p.m. 59. Latex Masterbatching—Compounding, Development, Future Possibilities, and Influence on Rubber Manufacture. I. Drogin, United Carbon Co., Inc., New York, N. Y.

Session No. 11—Friday Morning, November 13

R. F. Dunbrook, Chairman

Polymers and Polymer Structure

9:00 a.m. 60. Compounding *Cis*-Polybutadiene. H. E. Railsback, C. C. Biard, J. R. Haws, Phillips Petroleum Co., Bartlesville, Okla.

9:30 a.m. 61. *Cis-Trans* Isomerization in Natural Polyisoprenes. J. I. Cunneen, BRPRA.

10:00 a.m. 62. Polymerization of Vinyl Monomers in Rubber Latices. P. W. Allen, C. L. M. Bell, E. G. Cockbain, BRPRA.

10:25 a.m. 63. Synthesis and Properties of Organotin Elastomers. J. C. Montermoso, T. M. Andrews, L. P. Marinelli, B. LaLiberte, Quartermaster Research & Development Center, Natick, Mass.

10:45 a.m. 64. Silicone Rubber—Today and Tomorrow. P. C. Servais and K. E. Polmanteer, Dow Corning Corp., Midland.

11:05 a.m. 65. The Structure of Chlorosulfonated Polyethylene. A. Nersasian and D. E. Andersen, Du Pont.

11:30 a.m. 66. Relation of Structure to Properties in Polyurethanes. E. F. Cluff and E. K. Gladding, Du Pont.

Session No. 12—Friday Afternoon, November 13

A. E. Juve, Chairman

Vulcanization

2:00 p.m. 67. Properties of Compounds Relative to Vulcanization. J. H. Gifford, Witco Chemical Co., Akron.

2:20 p.m. 68. Estimation of State of Cure Using S-35. H. L. Pederson, Nordiske Kabel-OG Traadfabriker, Copenhagen, Denmark.

2:50 p.m. 69. Chemical Interpretation of Dicumyl Peroxide Vulcanization. L. O. Amberg and W. D. Willis, Hercules Powder Co., Wilmington.

3:15 p.m. 70. Chemistry of Vulcanization of "Viton" A Fluorocarbon Elastomer. J. F. Smith, Du Pont.

3:35 p.m. 71. Crystallization and Cure Studies of Neoprene W Using Dielectric Measurements. M. Hanok and I. N. Cooperman, New York Naval Shipyard, Brooklyn, N. Y.

4:00 p.m. 72. Investigation of Radical and Polar Mechanisms in Vulcanization Reactions. J. R. Shelton and E. T. McDonel, Case Institute.

4:25 p.m. 73. Contrasts in the Response of Elastomers to High-Temperature Vulcanization. F. B. Smith, Naugatuck Chemical Division, U. S. Rubber, Naugatuck, Conn.

International Rubber Conference Program *(Continued)*

8. Construction and Performance of Butyl Passenger Car Tires. J. L. Ernst and S. R. Shuart, Enjay Laboratories.

The commercialization of butyl rubber passenger-car tires marks a new era in the history of tires. Many problems were encountered during the development of these tires to the point where performance worthy of a commercial tire could be demonstrated. The solution to these problems did not lie in compounding alone, but involved the development of special rubber chemicals, compounding techniques, tire construction, and development of tread designs specifically for butyl rubber.

Even in the first butyl rubber tires a greatly improved riding quality coupled with low noise level and complete lack of squeal was observed. Some time later it was found that greatly improved traction and braking were inherent with the butyl rubber tire regardless of design. Recent work by Tabor, Giles, and Sabey[1] has shown that high hysteresis leads to better braking and traction which confirms this performance characteristic of the butyl rubber tire.

Some of the more important developments such as chemically promoted heat interaction of polymer and black, butyl latex for cord dipping, and tread and carcass compounding effects are covered briefly. Data are presented showing how the performance of butyl rubber tires relates to other commercial tires with respect to wear, durability, traction, comfort, and fuel consumption.

[1] "Friction between Tire and Road," D. Tabor, *Engineering*, Dec., 1958, and "Rubber Hysteresis and Skidding Resistance," C. G. Giles and B. E. Sabey, *Ibid.*, Dec., 1958.

24. A Study of the Behavior of Selected Derivatives of p-Phenylene Diamine in Rubber Compounds. E. R. Thornley and J. T. Watts, Imperial Chemical Industries, Ltd.

A number of derivatives of p-phenylene diamine have been examined to determine their antiozonant properties in SBR and natural rubber over a wide range of conditions.

A new dynamic exposure test suitable for both ozone cabinet and outdoor testing has been developed in which use is made of the De Mattia flexing machine. It will be demonstrated that by reducing considerably the maximum strain in the test piece and by testing in an atmosphere containing ozone, typical systems of ozone cracking are produced in place of the flex cracking obtained in the standard De Mattia test. The relation between the two types of test (flex cracking and ozone cracking) is discussed.

It is demonstrated that quite good correlation was obtained between the results of the modified De Mattia test and those of ozone resistance tests conducted on actual tires, using an outdoor wheel test.

It is shown that the relative efficiency of one antiozonant as compared with another varies significantly according to the type of polymer used, the test (or service) conditions, and the order of protection required. 4-isopropyl amino-diphenylamine (N-phenyl-N'-isopropyl p-phenylene diamine) has outstanding antiozonant properties, especially under dynamic conditions of exposure. This particular chemical is selected for additional compounding studies which include an investigation of its behavior when used in conjunction with various waxes, and consideration for certain specific applications.

40. Zinc Oxide Stability Testing of Natural and Synthetic Latices. J. L. M. Newnham and D. J. Simcox, Dunlop Rubber Co., Ltd.

Though a mechanical stability or M.S.T. test for natural latex has now been internationally recognized, no method for testing the chemical stability of natural latex has yet reached the same state of development and recognition.

A study has been made of the effect of factors controlling the mechanical stability time of latex in the presence of zinc oxide, and a zinc oxide stability or Z.S.T. test is proposed. This new test is very reproducible, is quite independent of interlaboratory variables such as the zinc oxide dispersion, and takes account of latex variables affecting the solubility of zinc oxide in latex serum. It gives a useful measure of the zinc sensitivity which allows choice of a latex for a particular type of process, or for control checking of consecutive latex batches.

The development of a zinc oxide stability test of similar applicability

for cold-rubber high-solids synthetic latices is also described.

Finally, zinc stability testing data are presented for blends of natural and synthetic latex. These data give an indication for a given synthetic latex of how much may be blended with natural without adversely affecting processability. The test procedure is suggested as a laboratory method for the determination of this quantity when dealing with different types and batches of natural and synthetic latex.

41. A Strain-Test for Latex Films and Its Applications. P. R. Gyss and C. E. Wu, Socfin Co., Ltd.

A technique for casting molded test specimens from compounded natural rubber latex concentrate is described. The relation between specimen thickness and "strain-value" is found to be of the same nature as that arrived at by other workers using specimens molded from compounds prepared by milling solid rubber. The correlation between "strain-value" and modulus at 100% elongation obtained on specimens prepared by the technique described is also given.

On the basis of these tests it is demonstrated that naturally occurring variability between identically preserved latices is small, but different types of preservation result in vulcanized films of different physical properties. It is further shown that variations in the physical properties of cured latex films are reflected in the compressibility of foam rubbers prepared from the latices, provided the foams are of identical structure. The main cause for variability in foam rubber is, however, shown to be its structure. The equipment used for the strain, modulus, and compression tests is described in some detail.

55. Some Aspects of Rubber-Textile Adhesion. G. M. Doyle, Dunlop Rubber Co., Ltd.

Resorcinol-formaldehyde-latex adhesives for bonding textile to rubber are generally prepared by condensing resorcinol and formaldehyde under alkaline conditions, at least partially in the presence of a rubber latex.

It is shown that, under constant conditions of treatment of the textile, the bond strengths given by typical adhesives exhibit a close relation to the average number of available reactive sites per resorcinol unit in the resins formed at the time of application to the textile. Resins of different degrees of condensation are required for maximum adhesion, depending on the latex used in the adhesive and the textile to be bonded. A further condensation of the resin can take place during the processing of the textile after treatment with adhesive, and the number of reactive sites which ultimately determine the bond strength is believed to be the number available at the time of vulcanization.

As distinct from resorcinol-formaldehyde-latex systems in which the resin is already partially formed in the adhesive applied to the textile, the reaction to form the resin can also be made to take place entirely during the vulcanization of the cord-rubber assemblage. In this case also, there is evidence of a relation between bond strength and the composition of the resin.

56. Factors Influencing the Stability of SBR Latex. F. A. Sliemers, B. Bennett, P. B. Stickney, G. Heiligmann, Battelle Memorial Institute; H. K. J. de Decker, Texas-U. S. Research Center.

The theory is proposed that latex destabilization proceeds by means of a time-dependent localized polymer-particle dehydration. The dehydration apparently occurs in two stages. In the initial stage, more or less reversible aggregates are formed. This "creaming" is accompanied by a perceptible increase in latex viscosity. In the second stage, the aggregates are further dehydrated and coalescence occurs. The latter process is irreversible.

Evidence is presented to support the argument that the prime requirement for the dehydration and, consequently, for the destabilization of high-stability latex is the presence of a static latex surface in contact with an unsaturated gas phase. The three factors involved here are (1) surface area, (2) surface agitation, and (3) gaseous head space. In addition, it is shown that stability is influenced by a number of other factors, including (1) temperature, (2) polymer concentration, and (3) polymer-particle size.

57. The Colloidal Properties of Synthetic Copolymer Latices. C. F. Fryling and E. M. Gindler, Koppers Co., Inc.

Harkins, Maron, and others have conducted extensive investigations on the role of surface active agents during emulsion copolymerization to form synthetic rubber latices. The researchers demonstrated that emulsion polymerization owes its unique characteristics to solubilization of monomers by "soaps" at higher than critical micelle concentrations. This theory, however, is inadequate to explain the gelation of latex which is obtained under certain well-defined conditions. It appears probable that gelation of latex has not received its due consideration because initiation of emulsion polymerization is usually induced with potassium persulfate, thereby introducing an electrolyte which effectively prevents gelation.

Theoretical analysis of variations of pH observed in emulsion polymerization processes indicates that hydrolysis of fatty acid soaps is an important factor in establishing the colloidal properties of synthetc rubber latice. It is based upon the Bronsted and Bjerrum relation that the primary salt effect increases the acid activity of weak acids. This analysis is also in agreement with the findings of Per Ekwall on "Concentration Limits in Association Colloid Solutions."[2]

The gelation of latex can be visualized in accordance with the above theory as the establishment by hydrogen bonding of ligands of fatty acid molecules between the latex particles. A three-dimensional network results, which can be readily broken by the addition of electrolytes. Thus the anomaly of gel formation by latex particles of only 0.2μ diameter, in contrast with theories that "stress the importance of large colloidal particles," is readily explained.

In addition to gelation, the following related phenomena are considered: inversion by hydrophilic protective colloids; film formation involving a transitory sponge structure intermediate between oil-in-water and water-in-oil systems; and concentration by an improved method to give high solids, low viscosity latex.

58. Developments in Superior Processing Natural Rubber. H. C. Baker, BRPRA.

SP (Superior Processing) rubber is an intimate 1:4 blend of vulcanized and unvulcanized rubber prepared in Malaya by patented processes. In the three years since the introduction of SP crepe the consumption of SP first-quality grades of sheet and crepe has steadily grown to a four-figure annual tonnage in 1958. The characteristics of SP rubber resulting from its two-phase nature, and their consequences in simplifying, cheapening, and enlarging the scope of manufacturing operations are briefly described, and a short account of the field of usage of SP rubbers is given.

Recent developments in Malaya have centered on the production by a patented process of SP rubber containing a much higher proportion of cross-linked rubber, which has been used to prepare SP Brown Crepe from estate scrap, and SP-90 for use by manufacturers as a compounding ingredient and processing aid by blending with any desired grade of NR or with SBR or certain other synthetic rubbers.

The use of SP-90 to achieve greater flexibility of compounding is discussed, and some particular examples of its application are included. The results are presented of a comparative study of blends of ordinary NR, SP rubber, SP-90, SBR 1009 cross-linked polymer, with SBR types in gum stocks, white and black loaded compounds for extrusion properties and physicals of unaged and aged vulcanizates.

Other data cover results from a pilot-plant evaluation of SP RSS in pure gum and white loaded stocks for calendering and extrusion in comparison with ordinary RSS, and laboratory

[2] *J. Colloid. Sci.*, 1954 Supplement, pp. 66-80.

studies of the processing, vulcanizing, and aging characteristics of SP rubbers in comparison with ordinary NR in the absence and presence of conventional processing aids.

59. Latex Masterbatching — Compounding, Developments, Future Possibilities, and Influence on Rubber Manufacture. I. Drogin, United Carbon Co., Inc.

The wet masterbatching of SBR latex with oil and/or carbon black has resulted in quality and economic advantages for consumers. Some of the quality advantages are improved dispersion, assurance of better product uniformity, and equal or better abrasion resistance than that obtained with a corresponding dry mix; and some of the economic advantages are lower processing costs, cleaner production, and simplification of warehousing, handling, and maintenance.

Increased interest in wet latex masterbatching of carbon black has been spurred on by the development of more effective means of improving the carbon black dispersion, and also by making available to consumers a wider selection of masterbatched polymers. For the first 10 months of 1958, 40.3% of the total production of SBR was wet masterbatched in the latex stage, of which 30.4% was with oil, 4.6% with carbon black, and 5.3% with carbon black and oil. Now available are polymers extended with naphthenic or aromatic oils at 25-50 parts per 100 parts rubber hydrocarbon, or with oil and carbon black, or masterbatched with carbon blacks of the SAF, ISAF, HAF, EPC, FEF, SRF, and MT types at various loadings with or without added processing oil.

It is felt that the ultimate goal in wet latex masterbatching would be to produce a completely compounded polymer to satisfy the consumers' requirements, which would also be in a form readily available for shipment in bulk and for direct processing. It is also envisioned that the final (productive) latex masterbatched compound would be pelletized at the point of origin and shipped in bulk. The pellets would then be air conveyed, stored in bulk, and fed from a hopper into the final processing machinery, e.g., a tuber for extrusion directly to a desired contour, such as a tire tread. The new equipment is expected to reduce substantially the use of present heavy, power-consuming mills and reduce materially the capital requirement for rubber manufacture.

Wet latex masterbatching is, without doubt, a stepping stone to an improved product with better uniformity, and to reduction in labor and equipment costs. Further improvements in this type of masterbatching will bring about additional product quality and economic advantages for consumers.

60. Compounding *Cis*-Polybutadiene. H. E. Railsback, C. C. Biard, J. R. Haws, Phillips Petroleum Co.

The outstanding abrasion resistance and excellent hysteresis properties of *cis*-polybutadiene have attracted widespread interest. Semi-commercial quantities of the rubber are now available, and this paper presents a review of its processing, extrusion, vulcanization, and physical properties.

A number of compounding variations have been found to improve the processing characteristics of *cis*-polybutadiene in tread formulations. They include the following: (1) higher than the normal 50 phr. of black (60 to 65 phr.) gives smoother stocks; (2) decreasing the stearic acid from 2.0 to 0.5 phr. improves mill banding; however, stearic acid is a very effective extrusion aid, and at least 0.5 phr. is desirable for this reason; (3) pine tar improves mill handling, but retards cure and gives poorer heat build-up than petroleum-base oils; therefore, a blend of a petroleum-base oil with pine tar is recommended to obtain the best balance of processing and properties; (4) addition of a modified wood rosin gives a better cure curve and better hysteresis properties; (5) *cis*-polybutadiene, by cross-linking tests, gives inherently lower modulus than SBR 1500 or natural rubber and consequently must be cured to high cross-linking to approach commercial rubbers in modulus; (6) better processing stocks are obtained by Banbury rather than roll-mill mixing; and (7) the use of ISAF and SAF blacks gives improvement in tensile strength and abrasion resistance, compared to HAF black, whether *cis*-polybutadiene is used alone or in blends.

Easy processing compounds of excellent quality are obtained by blending *cis*-polybutadiene with other polymers such as natural rubber. In such blends the following statements apply: (1) the use of premasticated natural rubber, although not absolutely necessary, appears advisable for best processing; (2) the blend stocks do not appear to require special compounding to obtain acceptable processing; (3) again, the use of a modified wood rosin appears beneficial, but not mandatory; and (4) lower modulus than is customarily obtained with natural rubber will give the best balance of properties including service performance.

Service tests to date have shown *cis*-polybutadiene to give an average of 36% better wear than SBR 1500 in passenger-car tires. Fifty-fifty blends of *cis*-polybutadiene and natural rubber have shown an average of 14% better wear than natural rubber in year-round tests with passenger-car and truck tires.

61. *Cis-Trans* Isomerization in Natural Polyisoprenes. J. I. Cunneen, BRPRA.

The naturally occurring polyisoprenes, rubber (*cis*), gutta percha (*trans*), and squalene (*trans*), have been isomerized for the first time by reaction with substances which add reversibly to double bonds, i.e., the reagent adds to a double bond and then rapidly splits off again to reform the double bond, sometimes of different configuration to the original. Thiol acids, certain disulphides, and sulfur dioxide are efficient reagents for carrying out these configurational changes.

Isomerization was detected spectroscopically in the infrared, and experiments with a model olefin having the isoprenoid structure, 3-methylpent-2-ene showed that its *cis* and *trans* forms were rapidly converted into an equilibrium mixture on reaction with the above reagents. Later studies with the polyisoprenes themselves have shown that similar isomerization occurs; the extent of isomerization is followed quantitatively.

Configurational changes in the double bonds of natural rubber and gutta percha cause marked changes in physical properties. For example, conversion of only a few % of the double bonds in natural rubber from the *cis* to the *trans* form reduces the rate of crystallization at low temperatures several hundredfold; while the reverse change in gutta percha gives a rubber-like polymer at room temperature.

62. Polymerization of Vinyl Monomers in Rubber Latices. P. W. Allen, C. L. M. Bell and E. G. Cockbain, BRPRA.

Methods of initiating polymerization of various vinyl monomers in natural and synthetic rubber latices are reviewed, with particular reference to techniques producing little or no homopolymer.

Kinetic data are presented for polymerization in natural rubber latex, using either water-soluble or rubber-soluble initiators. With some monomers such as methyl methacrylate, the kinetic results indicate that inter-molecular association occurs between the growing polymethyl methacrylate chains to give submicroscopic aggregates of very high viscosity. In these cases, the rate determining step in the polymerization process is the diffusion of monomer into the aggregates. Evidence is given to show that the *distribution* of such aggregates within the parent latex particles is affected by the nature of the polymerization initiator. With water-soluble or combinations of water-soluble and rubber-soluble initiators, the aggregates are believed to be formed preferentially in the surface regions of the latex particles. One consequence of this non-uniform distribution is that the smaller latex particles contain a greater percentage of polymerized monomer than the larger particles. The colloidal and film-forming properties of the resulting graft polymer latices are also markedly influenced by the distribution of the aggregates within the latex particles.

Methods of effecting the redistribution of the polymerized monomer in graft polymer latex films are discussed.

63. Synthesis and Properties of Organotin Elastomers. J. C. Montermoso, T. M. Andrews, L. P. Marinelli, B. LaLiberte, Quartermaster Research & Engineering Center.

Studies on organotin compounds were directed toward development of new elastomers having a combination or combinations of two or more of the following properties: flame-retardance, chemical resistance, thermal stability at high temperatures, and flexibility at low temperatures.

Tin elastomers have been successfully synthesized by the reactions of tin oxides and organic compounds. Monomers containing tin have also been made, which in turn, can be copolymerized with other types of monomers to produce elastomers possessing the desired characteristics. Monomers containing phosphorus, fluorine, and chlorine have been copolymerized with the tin monomer to produce elastomeric materials.

The following phases of investigations on tin elastomers will be discussed: polymerization, vulcanization techniques, and the physical and chemical properties of the base gum and of the vulcanizates.

64. Silicone Rubber—Today and Tomorrow. P. C. Servais and K. E. Polmanteer, Dow Corning Corp.

This paper describes the rapid growth of silicone rubber in the last 15 years, its present status, and some predictions of its potential.

There were few uses for silicone rubber until design engineers became aware of its resistance to heat, cold, and weathering. Widespread uses have increased production and made possible repeated price reductions. Wider use should generate future price reductions.

All of the early silicone rubber formulations were based on dimethyl silicone polymer. The substitution of other organic groups for some of the methyl groups alters the properties of present-day silicone rubbers in many useful ways. For example, phenyl groups enhance high- and low-temperature utility; vinyl groups control vulcanization and reduce compression set; cyano and fluoro-organo groups improve oil and fuel resistance. Many more groups are being studied to improve the strength and resistance of the silicone rubbers of the future.

Compounding was once done only by the polymer manufacturers. Now, polymers and partly reinforced polymers are available to the rubber compounders. Many improvements should come from the work of these compounders.

Vulcanization, once done only with organic peroxides, can now be done with sulfur, organo-metallic salts, and radiation. Vulcanization temperatures can be varied from room temperature to 650° F. Vulcanization times can vary from a few seconds to days. Hot air, steam, hot liquids, and radiation can all be used. New developments in this area seem unlimited.

Judging from the rapid sequence of silicone rubber developments in the past, it appears that the future should hold similar advances in polymers reinforcing fillers, vulcanization systems, and applications.

65. The Structure of Chlorosulfonated Polyethylene. A. Nersasian and D. E. Andersen, E. I. du Pont de Nemours & Co., Inc.

The chlorines in chlorosulfonated polyethylene, "Hypalon" synthetic rubber, have been characterized by kinetic analysis according to the method of Saloman. It is found that 2.7% of the total chlorine is primary, 89.8% secondary, 3.5% tertiary, and 4% is sulfonyl chloride.

These results are in accord with statistical calculations based on a polyethylene model containing the same methylene to methyl group ratio as the polyethylene precursor of "Hypalon."

The types and approximate quantities of dichlorides in "Hypalon" have been determined by reactions with potassium iodide and zinc dust.

66. Relation of Structure to Properties in Polyurethanes. E. F. Cluff and E. K. Gladding, Du Pont.

The influence of cross-link structure on the gum vulcanizate properties of a polyurethane elastomer is described. The elastomer contained the polytetramethylene ether as its main constituent, and pendant hydroxyl and carbon-carbon double bonds were attached at intervals along the chain. Curing was effected by either diisocyanates or an accelerated sulfur recipe to give cross-links of different chemical structure. Isocyanate-terminated prepolymers of different lengths were also used as cross-linking agents to investigate the influence of cross-link length. Vulcanizate properties measured were modulus, resilience, hardness, and compression set. A method for distinguishing between mono- and disulfide cross-linkages is also described.

New Butyl Concepts Talk by Smith to CRG

The first fall meeting of the Chicago Rubber Group was held at the Furniture Club, Chicago, Ill., on September 18, with about 160 present. The meeting included the usual cocktail hour, dinner, and technical session. The program consisted of two parts, a talk on butyl rubber by W. C. Smith, Enjay Laboratories, Linden, N. J., and a U.S. Government motion picture which covered methods of manufacture of butyl rubber.

The talk, entitled "New Concepts in Butyl," by Mr. Smith, covered some of the latest developments in cure systems for butyl and some information on the newer chlorobutyl polymer.

The first point brought out by the speaker was the advantages in desirable physical properties obtained by using sulfur donor materials rather than elemental sulfur for curing butyl compounds. These donors may be morpholine disulfide, thiuram tetrasulfides, or dibutyl xanthogen disulfides. Data were presented to show the improvement in compression set obtained with these donor systems including dynamic compression measured on the Goodrich flexometer. The stable cross-links which give this desirable low set property also produce good heat aging compounds. Aging at 275° F. for extended periods and at 300° F. for shorter periods show that donor cured compounds give superior aging stocks.

Additional work on low sulfur cures was also reported. It was found that some desirable compounds could be formulated with only 0.33-part of sulfur, but with 3-4 parts of an accelerator such as tellurium diethyl dithiocarbamate. It was found further that the sulfur must be present, however, in the small amount. The accelerator alone is not sufficient and produces essentially no cure. The speaker concluded that these two cure systems as well as resin-type cure produces more stable cross-links than elemental sulfur cross-linkages.

Smith also gave some new information on this resin-type cure system. Data were presented showing several modifications of resin cures and the good and bad points for each including the use of a new bromo-resin which is self-activating.

The remaining portion of the talk was concerned with the newer chlorobutyl polymer. By substituting 1.2 weight % chlorine on the butyl chain the material can be cured by a much wider range of curing agents. Both the allylic chlorine and the unsaturation of the butyl portion of the chain present cross-linking sites, thus permitting a wide variety of cure systems to obtain specific properties or sets of properties. Tables were presented giving 12 basic cure systems which may be used with this chlorobutyl polymer and listing the merits as well as the demerits of each. For instance, a cure system containing only zinc oxide and no organic accelerators would be used for non-toxic applications, but would give a vulcanizate relatively low in tensile strength and would be slow curing while a fast-cure system giving heat and tear resistance and high tensile might tend to be scorchy.

Some chemical theory concerning the methods by which these various cure systems work was also covered.

Angier Talks on Block Polymers before TTC

More than 200 guests attended the Thiokol Technical Club meeting held at the Thiokol Chemical Co.'s plant in Trenton, N. J., on September 10. A very pleasant reception and dinner preceded the technical session, with D. J. Angier, American Foam Rubber Corp., Burlington, N. J., as featured speaker.

Dr. Angier spoke on "Block Copolymers by Mastication," which was a summary of work he did with W. F. Watson while with the British Rubber Producers' Research Association, Welwyn Garden City, Herts, England, prior to Angier's coming to the United States in 1956. This work investigated the mastication of natural rubber and some effects that take place. It was found that when a monomer such as methyl methacrylate was admixed with natural rubber and subjected to shearing forces, polymerization of the methyl methacrylate would take place on rupture of the rubber molecules to free radicals. The polymeric products formed after different conditions and extents of reaction have been separated into uncombined rubber, two interpolymer fractions, and uncombined polymethyl methacrylate by fractional precipitation and extraction methods. The interpolymer is a linear block polymer containing one polymethyl methacrylate segment and of the order of one or two rubber segments per molecule. It was suggested that these copolymers might have applications in cases where rubber is used to increase impact resistance of plastics. The addition of the rubber in the form of these block copolymers with the plastic does not cause some of the undesirable changes in physical properties usually associated with the direct addition of rubber to the plastic.

The work done has been reported in the British Rubber Producers' Research Association bulletins: specifically: Publication No. 266, "Mastication of Rubber, Part V. Separation and Structural Investigation of Natural Rubber-Polymethyl Methacrylate Formed by Mastication"; and Publication No. 267, "Mastication of Rubber, Part VI. Viscosity and Molecular Weight Relationships for Natural Rubber after Cold Mastication."

Connecticut Outing

A record attendance of 193 members was reported for the fourteenth annual outing of the Connecticut Rubber Group, held at Grassy Hill Park, Derby, Conn., on September 12. The general outing committee consisted of Bill O'Brien, Seamless Rubber Co., chairman; Rial Potter, K. B. C. Industries, Inc., vice chairman; Frank Smith, Naugatuck Chemical, treasurer; and Ed Hansen, Naugatuck Chemical, assistant treasurer.

The committee chairmen of the various events and the winners of the events are as follows: softball, chairman, George Jerolman; horseshoes, chairman, Dick Ward, Du Pont, winner, P. Blanchard, P. Blanchard Co.; golf, George Sprague, B. F. Goodrich Sponge Products Co.; egg throwing, chairman, Whitey Larson, won by Ed Hansen and T. Zimmerman, R. T. Vanderbilt Co.

The greeting committee was chairmanned by Charlie Haynes, National Polychemicals, Inc. The bocci contest, won by W. Hartmann, Harwick Standard Chemical Co., and T. Farley, Vanderbilt, was chairmanned by Harry Gordon, Bond Rubber Co. Volley ball chairman was T. Zimmerman, and the winning team included D. Morris, E. Mulchahy, W. Taylor, B. Carlson, and H. Beadle, all of the R. T. Vanderbilt laboratory.

Plasticizers Theme of VIPAC, SPE, Meeting

The New York Section of the Society of Plastics Engineers, Inc., held its first meeting of the season at the Governor Clinton Hotel, New York, N. Y., on September 16. The Vinyl Professional Activities Committee (VIPAC) of the Section presented Part I of a two-part series on "The Effect of Plasticizers, in Processing Vinyls." Part II, covering plastisols and secondary plasticizers, will be presented at the next meeting, October 21. The general meeting was held separate and featured a paper on impact molding, a description of which follows.

J. Decker and G. Gilmore, both of Bopp-Decker Plastics, Clawson, Mich., described the "Practical Considerations in the Use of Sequential Impact Molding." The discussion covered the theory, mechanical means, and advantages of exploding or impacting precompressed material into two or more cavities or groups of cavities in sequence. The speakers next dealt with some practical considerations such as machine operation, elements of control, mold design, personnel training, and availability of sequential impact molding equipment.

The VIPAC's program was introduced by R. L. Kern, Thompson Chemical Co., Pawtucket, R. I. As moderator of VIPAC, he presented Part I of the two-part series by discussing the uses of plasticizers in processing vinyls and pointed out the function of facilitating compounding by plasticization.

The second VIPAC paper, "The effect of Plasticizers in Banbury Processing of Vinyl Resins," was presented by W. F. Waychoff, Monsanto Chemical Co., St. Louis Mo. The effect of various plasticizers, when Banbury mixed, on fusion time, horsepower requirements, and total processing time was discussed. Studies also covered the effect of plasticizer level, lubricant

Front row: *(left to right)* Al Murdoch, Ed Hansen, George Sprague, Tom Zimmerman, Whitey Larson; *back row:* Warren Carter, George Jerolman, Charlie Haynes, Bill Couch, Bill O'Brien, Frank Smith, Vin Chadwick, Dick Ward, Rial Potter, Harry Gordon, Frank Villa, and Frank Palumbo



level, filler loading, and plasticizer mixtures. These data pointed out ways to increase plant capacity by the selection of raw materials.

The final VIPAC paper of the meeting, "The Effect of Plasticiziers upon Dry Blending Resins," was given by R. A. Park, Firestone Plastics Co., Pottstown, Pa. In this presentation the effects of plasticizers upon dry blending resins and description of the basic characteristics of dry blending resins were given. The chemical nature of plasticizers and their effect upon PVC resins were discussed. The absorption characteristics of PVC resins were illustrated via dryness and Banbury fusion tests. Properties of plasticized PVC compounds in regard to aging characteristics were also illustrated.

Philly Golf Outing

Approximately 415 members and guests attended the annual summer golf outing of the Philadelphia Rubber Group on August 21 at the Manufacturers Golf & Country Club, Oreland, Pa. This was a record attendance for any outing sponsored by the Group.

The sporting events enjoyed by the members and guests consisted of an 18-hole golf tournament, swimming, and a putting contest. After dinner, which was served at 7:30 p.m., prizes were awarded to the winners of various events. Sixty door prizes were passed out, and one grand prize—a television set—was won by Jim Sinclair, Linear Rubber Co.

Playing golf were 221 members and guests—the largest number that the group has ever had.

The following were prize winners: members, low gross: W. B. Curtis, Naugatuck Chemical (this was the third win by Curtis and retired the Muehlstein Trophy); J. Vanderhoff, Owens-Illinois; and H. B. Pryor, R. E. Carroll, Inc. Hole-in-one was won by Russ Olsen, Carlisle Tire & Rubber Co. Longest drive went to H. M. Royal III, H. M. Royal, Inc.

Putting awards, members, went to P. Peffer, Du Pont; Stan Howard, Electric Hose & Rubber Co.; E. S. Kern, R. T. Vanderbilt Co. Calloway placers were J. Wernersbach, Enjay Co.; K. Hankins, C. S. Masland Co.; and T. Bagosian, Johns-Manville Corp. Jim Weaver, Harwick Standard Chemical Co., had the most stamina.

Other prizes, guests, went to: low gross, Jim Hunt, Okonite Wire & Cable Co.; longest drive, Bill Weber; putting, Ed Fillon, Alphaduct Wire & Cable Co. Calloway winners among guests were T. Weichel, Okonite; A. Carrola, Firestone Tire & Rubber Co.; and LeRoy Haas, NAFI Corp.

H. Remsberg, Carlisle Tire, was the general chairman of the outing. The prize committee consisted of T. W. Elkin, R. T. Vanderbilt; A. L. Shaw, B. F. Goodrich Co.; and H. Smith, Naugatuck Chemical.

The golf committee consisted of H. Sellers, A-S-H Molded Products Co.; G. McNamara, Midwest Rubber Reclaiming Co.; and T. N. Loser, Wyrough & Loser.

Akron Polymer Lecture Group Series

Bernard D. Coleman, Mellon Institute, inaugurated the thirteenth annual series of the Akron Polymer Lecture Group on October 2 with a discussion of **"The Mechanical Strength of Polymers."**

The lecture series, conducted under the auspices of the University of Akron, Akron, O., will continue once a month until May, 1960, with meetings beginning at 8:00 p.m. in Room 107, Knight Hall, University of Akron, Akron, O.

The seven remaining speakers and the subjects of their lectures follow:

November 6: A. Schallamach, British Rubber Producers' Research Association, **"How Tires Wear."**

December 4: W. E. Goode, Rohm & Haas Co., **"Stereospecific Polymerization of Acrylic Monomers."**

January 8, 1960: George B. Butler, Chemistry Department, University of Florida, **"Recent Advances in Polymerization by an Alternating Intra-Intermolecular Mechanism."**

February 5: Juan C. Montermoso, Quartermaster Research & Engineering Command, U. S. Army, **"Organo-Tin Polymers."**

March 4: S. O. Greenlee, Greenlee Research Co., **"Epoxy Polymers."**

April 1: Oscar Sisman, Oak Ridge National Laboratory, **"The Effects of Radiation on Polymers."**

May 6: H. Mark, Polytechnic Institute of Brooklyn, **"Progress in Polymer Synthesis and Application."**

Inquiries should be directed to John L. Binder, Program Chairman, Chemical and Physical Research Laboratories, The Firestone Tire & Rubber Co., Akron, O.

Correction

In the August issue of RUBBER WORLD, page 710, in a report of his paper given before the Society of Automotive Engineers at the June meeting in Atlantic City, N. J., J. H. DuBois, of the J. Harry DuBois Co., had his address given as Cincinnati, O. Mr. DuBois' company is located in Montclair, N. J. He is also chairman of the board of Tech-Art Plastics Co., Morristown, N. J.

CALENDAR

October 23
Akron Rubber Group. Sheraton Hotel, Akron, O.

October 26-28
Ninth Canadian High Polymer Forum. Guild Inn, Toronto, Ont., Canada.

October 26-31
International Standards Organization Technical Committee 45 on Rubber. Henry Hudson Hotel, New York.

November 5
Rhode Island Rubber Club. Fall Meeting. Pawtucket Country Club, Pawtucket, R. I.

November 6
Philadelphia Rubber Group. Fall Dance. Manufacturers Golf & Country Club.

Chicago Rubber Group. Furniture Club, Chicago, Ill.

Connecticut Rubber Group.

November 9-13
International Rubber Conference. Division of Rubber Chemistry, ACS; Committee D-11, ASTM; Rubber & Plastics Division, ASME. Shoreham Hotel, Washington, D. C.

November 29-December 4
American Society of Mechanical Engineers. Annual Meeting. Chalfonte-Haddon Hall, Atlantic City.

December 1
SPE Washington-Baltimore Section. Regional Technical Conference on "Stability of Plastics." Auditorium, National Academy of Science, Washington, D. C.

December 1-3
Eighth Annual Wire & Cable Symposium. Berkeley-Carteret Hotel, Asbury Park, N. J.

December 3
Fort Wayne Rubber & Plastics Group.

December 3-5
American Chemical Society. Southwest Regional Meeting. Capitol House, Baton Rouge, La.

December 8
Buffalo Rubber Group. Christmas Party. Buffalo Trap & Field Club, Buffalo, N. Y.

December 11
Detroit Rubber & Plastics Group. Christmas Party. Hotel Statler, Detroit, Mich.

Boston Rubber Group. Christmas Party. Hotel Somerset, Boston, Mass.

December 12
Southern Ohio Rubber Group. Christmas Party. Miami Valley Country Club, Dayton, O.

WASHINGTON REPORT

By JOHN F. KING

Stockpile Rotation Ends with 470,000-Ton Disposal Plan

The stockpile rubber rotation program has ended, at least in the form the rubber industry has known it for the past 15 years. In its stead, the industry will have available from a long-term disposal operation, 40,000 to 50,000 long tons of government-owned natural rubber a year, without the necessity of replacing it with an equivalent amount in the stockpile.

Total Disposal, 470,000 Tons

This is the import of the announcement of mid-September that 470,000 long tons of stockpiled rubber, from the government's 1.2-million-ton emergency inventory, would be sold off over the next nine years.

Disposal of the first year's sell-off lot of between 40,000 and 50,000 tons is scheduled to begin in the near future. The fiscal 1960 disposal operation is to be completed before next June 30, according to the General Services Administration which has operating custody of the $8 billion worth of goods in the National Defense Stockpile. GSA's decision was sanctioned by the highest levels in the government and had the requisite approval of the Office of Civil & Defense Mobilization, which is the controlling agency in stockpile policy.

Although the nine-year liquidation program still requires the approval of Congress, most officials connected with the operation of the rubber stockpile said this is no cause for worry. They said the temper of the legislative branch was clearly expressed in the language of the fiscal 1960 appropriation for GSA, OCDM, and other independent agencies. By simply refusing funds to rotate rubber in the current fiscal period, Congress effectively ordered the government to dispose of the 40,000 to 50,000 tons which were scheduled for rotation to prevent deterioration.

The administrative agencies took their cue from Congress and on the day that President Eisenhower signed the Independent Office Appropriations bill into law they announced the far-reaching change in policy on the rubber stockpile. The agencies had long sought an "out"—a means of unloading some of the expensive-to-maintain and strategically questionable surpluses, not only of rubber, but of a number of other items. Nothing has been said of the other stockpile items the Administration would like to liquidate, but that is bound to come. Rubber was chosen as the first of the substantial items in the security inventory to be disposed of in volume probably because of its perishable quality and, not incidentally, its present record high price on the open market. Non-availability of stockpile rotation rubber since July has been the cause of market confusion and shortages in some consuming plants.

GSA Announcement

In announcing the nine-year plan, GSA said that "disposal of the natural rubber will be made in such a manner as to protect producers, processors and consumers against avoidable disruption of their usual markets and to protect the United States against avoidable loss." The government agency added that it will vary the schedule for liquidations under the nine-year plan "in order to avoid undue disruption of markets."

The actual sales, GSA said, will be negotiated on the basis of prevailing market prices.

In its briefly worded announcement, GSA gave only two reasons for the decision to dispose of 470,000 tons from the rubber stockpile. First, it said, the move resulted "from a downward revision of objectives based on lower military requirements, technological advances, and a reduction of the planning basis for stockpiling from a five- to a three-year potential emergency."

Second, the 1960 appropriation act "provides authority for the sale without replacement of excess perishable stockpile items which otherwise would suffer from deterioration if held. . . .

"In accordance with this authority and pending the express Congressional approval of the overall disposal program required under [the basic 1946 Stockpile Act], 40,000 to 50,000 long tons of the total quantity of natural rubber to be disposed of will be offered for sale during the fiscal year ending June 30, 1960."

Legislative Balance Sheet on Major Items From 86th Congress

The first session of the 86th Congress, touted back in January as the most liberal to sit in the national legislature since the New Deal, ended on a most conservative note just hours before the arrival of Soviet Premier Khrushchev on September 15.

The legislators slipped out of town after having written a record which, contrary to all expectations when the first session began 8½ months ago, showed that heavily Democratic majorities do not necessarily mean socialistic legislation. For example:

Congress did not enact a single bill which might be termed, in the broadest sense, anti-business"; it did not promote the welfare state idea; it competed with President Eisenhower for the title of most fiscally conservative (except where popular spending programs such as public works and housing were involved); and finally, and most notable of all, it clamped down hard on organized labor, heretofore a pillar of strength in the Democratic Party.

It might be pointed out here the President and his adminstration, playing its cards shrewdly and using the resurrected coalition of conservative Republicans and Democrats for all it was worth, were highly instrumental in the conservative record of the first session.

Following is the balance sheet on major items of legislation in which the rubber industry was interested:

Taxes—A bill was enacted sharply limiting the rights of states to tax the income of out-of-state corporations. The legislaton in effect reverses a 1958 Supreme Court decision which gave individual states the right to levy taxes on income from sales in the state, regardless of whether the company involved maintained offices and/or plants in the state.

After a long deadlock over financing the highway program, the House Ways and Means Committee won its arguments with the House Public Works Committee, the President, and House Speaker Sam Rayburn, and pushed through a 21-month federal tax boost of 1¢ per gallon on gasoline. The Ways and Means tax bill also provided for the partial diversion of the 10% excise tax and the 8% tax on auto parts and accessories from the general to the special highway trust fund. The tax boost and diversion plan is expected to produce about a billion dollars that will help keep construction of the 41,000-mile interstate highway network nearly on schedule.

The Boggs bill to ease the tax load on foreign income of American companies became snarled up in drafting technicalities and will go over until next year.

Stockpiling—By refusing to appropriate funds to rotate rubber in the strategic stockpile, Congress pushed the Administration into action to start whittling down the 1.2-million-ton inventory (see related story).

Price Fixing—Despite sporadic attempts by liberal Democrats to "do something" to halt inflationary price boosts and to protect small business against big, little happened. Instrumental in stalling this drive were the Justice Department and the Federal Trade Commission, which argued that Congress cannot legislate competition.

Anti-trust—The performance of Congress here was just a little better, with the most important success being enactment of a bill to make FTC "cease and desist" orders final and binding on issuance (existing procedure requires three violations of such an order before penalties can apply). While this step was helpful toward streamlining anti-trust enforcement, it was a small one. As matters stood at adjournment, it was the only meaningful bill in the anti-trust field to pass.

These anti-trust bills, some hardy perennials, failed to go anywhere: S-11, which would limit the "good faith" defense in Robinson-Patman Act price discrimination cases; Premerger Notification, requiring firms representing assets of $10 million or more to give 60 days' notice to the government on any merger plan; Civil Investigative Demand, which would give the Justice Department authority to subpoena all relevant documents in civil anti-trust cases; the Bentley bill, which would limit the right of a manufacturer to distribute his product at the retail level.

Labor Reform—After one of the most spectacular Congressional battles in decades the Taft-Hartley Act was toughened up to make organizational, or "blackmail" picketing nearly illegal, and secondary boycotts completely against the law. The reform bill, known as the Griffin-Landrum Act, also turned over to the individual states, which tend to take a less sympathetic view of strike activities of labor than the Federal Government, wider jurisdiction over such activities. The legislation, the drive for which originally sprang from revelations of union corruption by the McClellan Committee, also cracks down hard on labor racketeering.

Major Companies Grant 10¢ An Hour Increase

Against the backdrop of a major crisis in management-labor relations—the protracted steel strike still deadlocked in mid-September—the rubber industry settled on a new wage agreement without a hitch. The long strikes of last spring over pension and welfare benefits apparently put both the rubber companies and the United Rubber Workers of America union (AFL-CIO) in a conciliatory frame of mind in their relatively brief negotiations over a new wage settlement.

Beginning August 31, when Goodyear Tire & Rubber Co. agreed to a 10¢ general wage increase for 23,000 employees in its 12 plants, representatives of rubber industry management and labor of other major companies signed a series of one-year wage agreements reflecting the same basic terms.

Following Goodyear during the first week in September were Firestone Tire & Rubber Co., The B. F. Goodrich Co., United States Rubber Co., and The General Tire & Rubber Co. As is traditional in the industry, the settlements will set the pattern for further agreements between URWA and other companies in the industry.

The agreements will increase the average hourly earnings of Goodyear's 23,000 covered employes, U. S. Rubber's 24,000, Goodrich's 14,000, Firestone's 16,000, and 3,500 General employes in Akron and Waco, Tex.

With minor variations, the settlements provide the 10¢-an-hour boost with the understanding that management and union representatives at the local plant level may apply a portion of the increase toward settlement of wage "inequities." In so doing the wage agreements provide that any inequity adjustments made shall be computed in terms of cents per hour based on all employes at a given plant and that the cost thereof shall be deducted from the general 10¢-an-hour increase. The amount remaining after deduction for inequities shall be regarded as a general increase for the plant in question.

Firestone To Produce Nylon for Tire Cord

Firestone Tire & Rubber Co. will become the first American rubber company to produce its own nylon filament yarn for the production of tire cord, according to an announcement made in mid-September by Harvey S. Firestone, Jr., chairman, at the conclusion of a board of directors' meeting held in Washington, D. C.

Firestone directors approved the purchase of a 250-acre property at Hopewell, Va., and the company will modernize the structures now located on the site and will have immediately available approximately 450,000 square feet of manufacturing space. Plans call for actual nylon production to get under way late in the Sumer of 1960, with construction operations scheduled to begin in mid-November.

The newly acquired facility will be devoted to the production of synthetic fibers, the first of which will be nylon. In addition, there will be located at the plant a manufacturing unit for the production of polypropylene resin.

Research scientists at Firestone developed the process for making the polypropylene resin as an outgrowth of their development of Coral rubber, a synthetic polyisoprene that has a molecular structure practically identical to that of natural rubber.

Entrance into the synthetic fiber field adds to the growing list of fields such as rubber, metals, plastics, chemicals, and textiles on which the Firestone Tire & Rubber Co. has spent hundreds of millions of dollars for expansion in the past four years, Mr. Firestone explained.

With the acquisition of the new property in Virginia, the Firestone Plastics Co., Pottstown, Pa., will become the Plastics and Synthetic Fibers Division of the Firestone Tire & Rubber Co. and will assume management responsibility of the Hopewell plant. Roger S. Firestone, now president of Firestone Plastics, will be president of the expanded operation, and Ernest T. Handley, executive vice president.

5,000,000 More Tires

The tire industry will sell nearly 5,000,000 more passenger-car tires this year than it had expected to only four months ago, E. F. Tomlinson, president of B. F. Goodrich Tire Co., a division of The B. F. Goodrich Co., Akron, O., said recently. One reason for the increase is a revised forecast for the number of vehicles in operation at the year end.

INDUSTRY NEWS

Monsanto Plans New Research Center

Monsanto Chemical Co. plans a research center at its general offices location in Creve Coeur, St. Louis County, Mo. In the initial phase, a building complex occupying about 400,000 square feet and consisting of two laboratories and supporting facilities including analytical laboratories, a library, glass-blowing facilities, and other services, will be constructed. Utilities and other special services will be provided from two separate structures. Completion is scheduled for 1961.

The new buildings are designed to match the campus atmosphere of the firm's general offices and will house about 800 scientific personnel. Ultimately most of the company's research will be centered here. As part of the initial program, the new center will provide research facilities for the inorganic chemicals, organic chemicals, research and engineering, plastics, and Lion Oil Co. divisions.

Dr. Wendell P. Metzner, an associate director of research for Monsanto's organic chemicals division, has been appointed administrative director of the new center. He will direct all supporting activities and services connected with the operation of the center. Divisional research effort will remain under the direction of the research directors of the individual divisions.

Many of the personnel involved in the initial program will be transferred from Dayton, O., and El Dorado, Ark. The transfers will not be accomplished for two years.

At present, Monsanto's research locations are widely scattered. The firm's Lion Oil Co. division does research work at El Dorado, Ark., and Texas City, Tex.; the organic chemicals division has a laboratory at Akron, O., another at Nitro, W. Va., one in St. Louis, Mo., and another at the Creve Coeur site; the plastics division has laboratories at Santa Clara, Calif., Seattle, Wash., Springfield, Mass., and Texas City, Tex. The research and engineering division has a laboratory at Dayton, O., another at Everett, Mass., where research is conducted on government-sponsored projects, and operates another laboratory at Miamisburg, O., for the Atomic Energy Commission. The inorganic chemicals division consolidated its research work at the Creve Coeur location in 1957, bringing to St. Louis personnel who had staffed separate laboratories at Everett, Mass., Anniston, Ala., and Dayton, O. Existing laboratories at Creve Coeur eventually will be tied in with the new structures.

McPherson Gets Award

Archibald T. McPherson has been awarded the United States Department of Commerce Gold Medal for Exceptional Service, in recognition of his work in improving the effectiveness of standardization activities of the National Bureau of Standards, and of his major contributions to the development of young scientists and engineers.

Since 1951, as associate director for engineering at NBS, Dr. McPherson has had overall supervision of the Bureau's work in mechanics and building technology. He is also responsible for Bureau-wide calibration and testing services and for the coordination of committee activities on codes and specifications.

Dr. McPherson was born at Marceline, Mo., in 1895. He received his B.A. degree from Trinity University and his M.S. degree from the University of Texas in 1916. In 1923 he was awarded a Ph.D. in chemistry from the University of Chicago.

He joined NBS in 1918, and became chief of the rubber section in 1930. During World War II he coordinated Bureau activities in rubber research and was instrumental in the application of new techniques, such as refractometry and mass spectrometry, in the accurate determination of the composition of monomers and polymers. He was called upon to evaluate many proposed emergency sources of rubber and developed a plan for the grading of wild rubber.

From 1943 to 1951, Dr. McPherson was chief of the organic and fibrous materials division, supervising Bureau research in the fields of organic plastics, dental materials, rubber, textile, leather, and paper technology. The major part of his work has been with rubber research, including investigations of the electrical, optical, and thermodynamic properties of rubber and research in rubber technology.

Dr. McPherson has published many research papers on rubber and in other fields of organic chemistry. He is co-author, with Dr. Alexander Klemin, of "Engineering Uses of Rubber."



Archibald T. McPherson

Schwartz To Distribute U. S. Rubber Adhesives

Schwartz Chemical Co., Long Island City, N. Y., has been named eastern distributor of a wide line of adhesives made by United States Rubber Co., New York, N. Y. The Schwartz company produces and distributes adhesives, cements, coatings and dyes for the plastics industries. The adhesives it manufactures are resin-based and tailored for specific plastics applications.

U. S. Rubber's adhesives are of the solvent variety. The headquarters for their manufacture is at the firm's footwear and general products division plant at Mishawaka, Ind. Chief uses for these adhesives have been in the automotive, furniture, aircraft, and electronics industries.

U. S. Rubber is expanding its line to include a flame-resistant adhesive for bonding metal surfaces to wood, for office furniture; a cement for natural rubber and polyurethane foams; and a thermosetting cement to bond glass and jewelry to metal. Schwartz will also distribute these products.

Schwartz Chemical was incorporated under its present name in 1946. The company was previously organized by A. A. Schwartz as the American Analytical Laboratories. The firm pioneered in the development of synthetic coatings and adhesives, including the first successful coatings for polystyrene.

The announcement of this appointment was made at a press conference held at the Hotel Roosevelt, New York, September 16. Charles P. Creamer, manager of sales for U. S. Rubber's adhesives, and A. A. Schwartz, president of Schwartz Chemical, were the speakers at the conference.

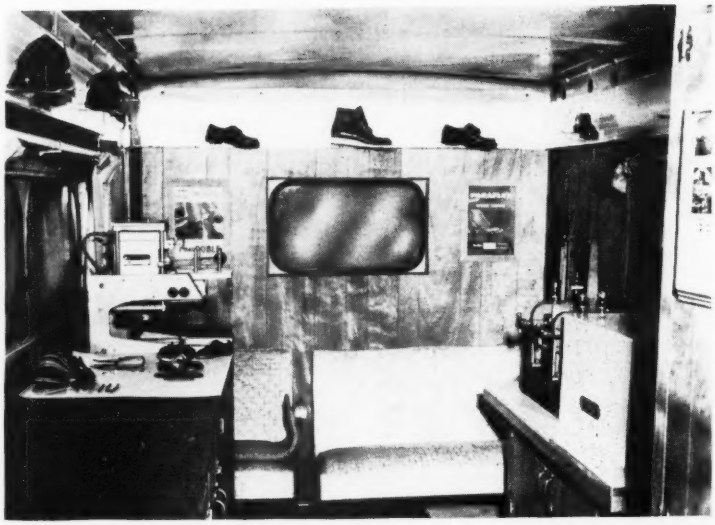
Du Pont Forms Unit To Market Its Fibers

Formation of an industrial marketing division responsible for all sales and merchandising efforts for Du Pont fibers in the industrial field has been announced by the textile fibers department, E. I. Du Pont de Nemours & Co., Inc., Wilmington, Del. The new division, which went into operation October 1, is designed to provide better service to industrial users of the company's fibers.

Millard G. Gamble is director of the new division, headquartering in Wilmington. He was manager of the regional sales office in Charlotte, N. C. From 1950 to 1953, Gamble, who has been associated with textile fibers sales for 14 years, was manager of Du Pont's high-tenacity rayon sales to the rubber industry. William B. Harman, assistant to the director of textile fibers sales, succeeds Gamble as manager of the Charlotte region.

The new division is responsible for the activities of the Akron, O., regional sales office, the special industrial sales efforts of the Philadelphia, Pa., regional sales office, and the industrial merchandising section at Wilmington. The Akron and Philadelphia industrial sales offices formerly were part of the district sales division; while the industrial merchandising section was part of the fibers merchandising division.

In the new setup Howard P. Brokaw will continue as regional manager of the Akron office, responsible for sales to the rubber industry and other industrial users of Du Pont fibers. Richard H. Morgan, reporting to Brokaw, will remain as manager of the special industrial sales office in Philadelphia. Charles E. Mears, manager of the industrial merchandising section, continues as its manager after it became part of the new division.



Interior of Wellco-Ro-Search mobile showroom with miniature "Process 82" vulcanizing press and rubber mill

Ro-Search Process 82 In Mobile Showroom

A mobile showroom, provided by Wellco-Ro-Search, Waynesville, N. C., demonstrating the actual manufacture of pressure-molded vulcanized leather footwear through a patented method, "Process 82," will soon start touring the shoe-manufacturing centers of the nation.

The mobile showroom is equipped with a working scaled-down model of the regular vulcanizing equipment used in actual production by factories both in the United States and abroad. A small rubber compounding mill is also displayed. The scaled-down model produces shoes of miniature size, but complete in every detail.

The interior walls of the carpeted van display "Process 82" footwear of every type being made in various affiliated plants throughout the world. Earl W. Mashburn, vice president of Ro-Search's United States operations, will accompany the van on its nationwide tour to demonstrate and explain the process to interested manufacturers.

At present, the mobile showroom is on loan to Branson McRae of Wadesville, N. C., who is establishing a shoe factory there to produce children's shoes by "Process 82." He is using the van to demonstrate to local townspeople the nature of the new industry which he is establishing there.

Mashburn's first trip with the van will be to the New England area where several shoe manufacturers have expressed interest in "Process 82" vulcanizing and wish to have their key personnel observe the actual operation of the system.

Gives Gloves To "Project Hope"

A year's supply of several thousand pairs of surgical gloves, made by The Pioneer Rubber Co., Willard, O., has been given as a gift to outfit the hospital ship of "Project Hope." The donation, made in a brief, informal ceremony by J. H. Gibson, Pioneer president, on behalf of the company, is valued at $10,000. It was accepted by Francis Boyer, chairman of the board of Smith, Kline & French and one of the directors of "Project Hope."

"Project Hope," part of the larger plan called, "The Great White Fleet," was detailed in a supporting article which appeared recently in Life magazine. The operation is sponsored by the People-To-People Foundation and will be financed by public subscription.

The hospital ship of "Project Hope," scheduled to sail in January, 1960, will be a sign of peace from the people of the United States to the underprivileged people of the world. Medical aid and advice will be brought into remote areas where they are most needed by a full staff of trained doctors, nurses and technicians.

Pioneer's gift will provide the floating hospital with a complete wardrobe of surgical gloves. It includes the company's line of latex and neoprene Rollpruf surgeons gloves, Quixam latex and neoprene examination gloves and latex obstetrical gloves.

Du Pont Cuts Price Of "Viton" Rubber

E. I. du Pont de Nemours & Co., Inc., elastomer chemicals department, Wilmington, Del., on October 1 reduced the price of its "Viton" synthetic rubber from $15 to $10 a pound. Able to perform in temperatures up to 600° F. in air, chemicals, and most liquids, "Viton" has enjoyed steadily increasing sales at the higher price since the synthetic's commercial introduction in March, 1958. This price cut is made possible by lower costs resulting from the increased demand for this versatile fluorine-containing elastomer, which now has wide use in aircraft and missile applications, where resistance to extremes of heat and chemical attack is required, and also in such diversified applications as automobiles and trucks, oil drilling and refining equipment, chemical processing equipment, and household appliances requiring resistance to heat, detergents, solvents, fuels, and chemicals.

You Can Count on Rapid Incorporation . . . Improved Dispersion With . . .

AZO ZZZ-55-TT

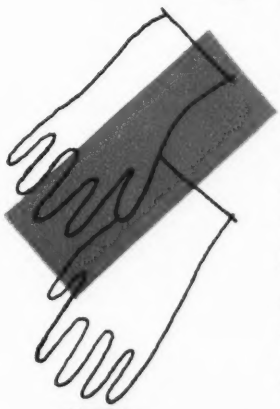


A Treated ZINC OXIDE For Use in Rubber

OTHER ADVANTAGES OF AZO ZZZ-55-TT

Faster curing
Safe processing
Improved scorch resistance
Lower acidity
High apparent density
Low moisture absorption
High tensile strength
Increased resistance to tear
Increased resistance to aging

NOTE:
AZO rubber grade zinc oxides are also available as AZODOX (de-aerated). AZODOX has twice the apparent density, half the dry bulk.



AZO ZZZ-55-TT is heat treated in a controlled atmosphere that removes objectionable trace elements and enhances mixing and dispersion. In addition, it is treated chemically to improve mixing and dispersion properties to an even greater degree.

AZO ZZZ-55-TT is a general purpose, smooth processing zinc oxide. We can highly recommend it to users who desire a treated zinc oxide. May we suggest that you try it in your most exacting recipes. Samples on request.

American Zinc sales company

Distributors for AMERICAN ZINC, LEAD & SMELTING COMPANY
COLUMBUS, OHIO • CHICAGO • ST. LOUIS • NEW YORK

NEWS BRIEFS

ALLIED CHEMICAL CORP.'S National Aniline division, New York, N. Y., has announced that the new lightweight polyurethane foam mattresses and pillows, now being introduced to the nation's homemakers, mark the first significant change in bedding material in years, in offering substantial advantages over foam rubber. The introduction of the fully molded pillow and mattress will also have a far-reaching effect on the growth of flexible polyurethane foam consumption. The bulk of this type of foam mattress in the future will be fully molded. Also as refrigerator insulation, foamed-in-place polyurethane increases inside refrigerator capacity 30 to 50%. This is due to rigid polyurethane's proven insulation factor of almost 2½ times that of currently specified insulation. Industry estimates indicate that 115 million pounds of rigid polyurethane foam will be used in 1964 in consumer and industrial applications now under development.

HUGHSON CHEMICAL CO., a division of Lord Mfg. Co., Erie, Pa., is offering for evaluation a new adhesive for bonding room-temperature-vulcanizing silicone rubber to metal. Designated Adhesive EX-B579-1, it provides bonding during the room temperature cure of silicone rubber compounds. Excellent bonds can be obtained with a wide variety of RTV silicone rubbers to steel, aluminum, brass, copper, and other metals as well as glass, porous ceramics, cured epoxies, phenolics and other resins, synthetic fabrics, and treated Teflon. Complete technical information and samples are available upon request from the company.

UNITED STATES ARMY on September 16 unveiled new manufacturing and testing facilities for medium and large rocket motors at its expanding Longhorn Ordnance Works rocket motors production plant, at Marshall, Tex., operated by Thiokol Chemical Corp. The new buildings and machinery will enable the plant to produce the big motors required for the Sergeant, Zeus, and Pershing, latest members of the Army missile system, while increasing the production efficiency of the medium-size units now being manufactured at the installation.

UNITED CARBON CO. and its subsidiaries have officially occupied new headquarters in Houston, Tex., effective September 15. The subsidiaries include United Carbon Co., Inc. (Maryland), and United Producing Co. Correspondence to these companies, formerly sent to the Charleston, W. Va., office, should be sent to Box 1503, Houston 1, Tex.

PRESRAY CORP., Pawling, N. Y., a subsidiary of Pawling Rubber Corp., has developed a radiation resistant rubber to be applied in the fabrication of pneumatic seals for nuclear reactors or in other types of seals or holding devices where radiation resistance is required. When exposed to radiation the new rubber material, designated as Presray Compound No. 1704, will retain a high degree of its original characteristics. Anti-radiation chemicals are added to the base polymer to produce a compound which will resist a high magnitude of radiation without breakdown. Presray Corp. is a leading manufacturer of pneumatic seals, lifts, grabs and allied pneumatic materials handling equipment.

THE GOODYEAR TIRE & RUBBER CO.'S aviation products division, Akron, O., reports that the use of sidewall-inflated tubeless aircraft tires, which eliminate valve stems and provide greater design flexibility, is becoming widespread on both military and commercial aircraft. With the development of sidewall inflation by Goodyear, airplane tires can be inflated just as a football is filled, by inserting a standard inflation needle in the sidewall. These new tires already have qualified for the Air Force and Navy.

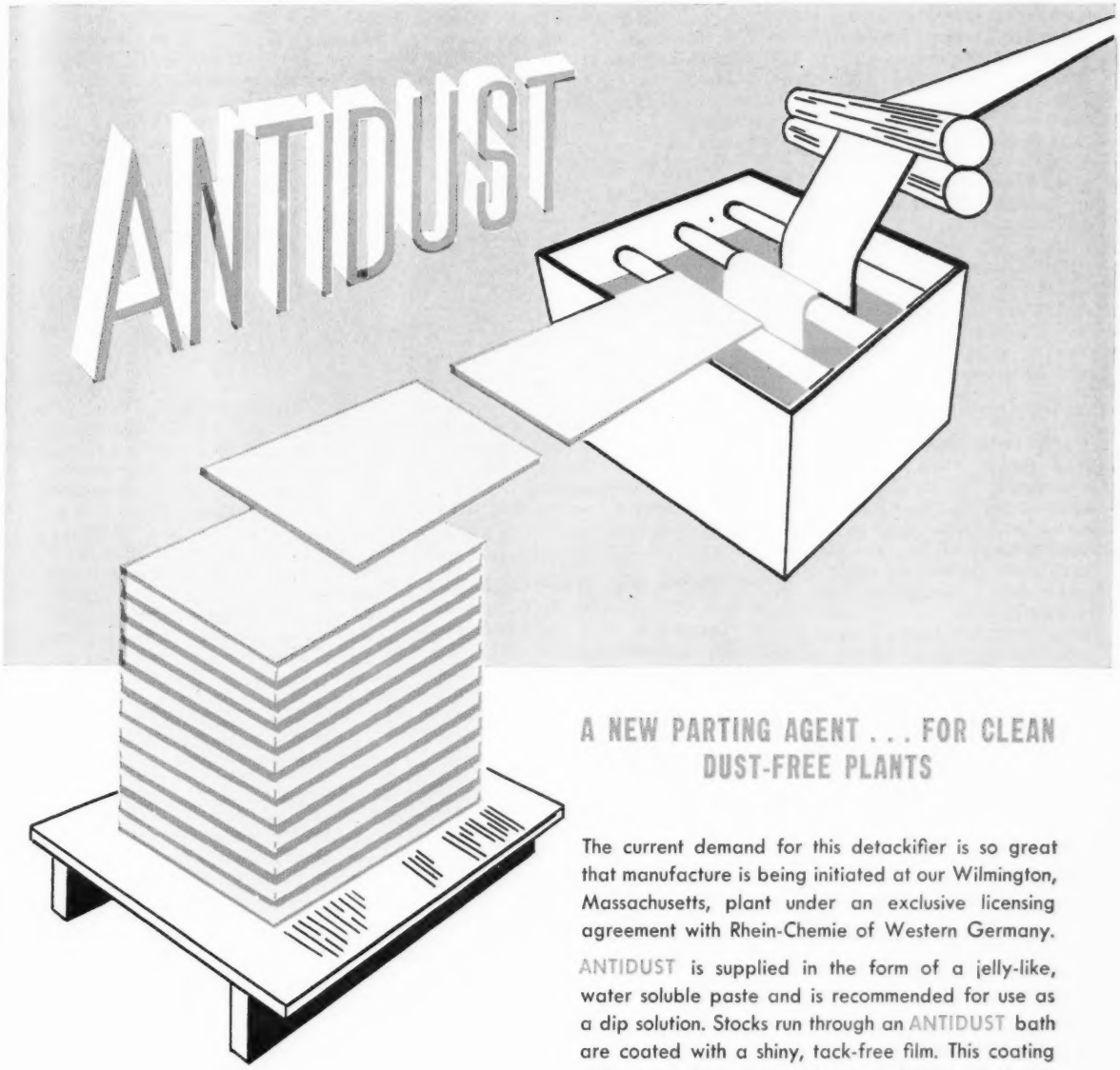
MANUFACTURERS CHEMICALS CO., INC., Philadelphia, Pa., has introduced Maniflex 500, a new latex backing said to give exceptional dimensional stability, virtually to eliminate shrinkage and stretch, and to prevent raveling of knit goods due to cutting and handling. The new clear latex film cures at low temperatures, can be applied by roller or spray, and is nontoxic and non-flammable. The film is also resistant to both laundering and dry cleaning, it is further claimed

HOOKER CHEMICAL CORP.'S Eastern Chemical and Durez Plastics divisions have established a new Buffalo district sales office in the recently remodeled Erlanger Building, 120 Delaware Ave., Buffalo, N. Y. according to John S. Coey and Alfred W. Hanmer, sales managers of the two divisions. The newly created Buffalo sales district for the Eastern Chemical Division will include New York State other than metropolitan New York, Canadian areas near Lake Ontario, western Pennsylvania, Ohio, West Virginia, and Kentucky. The Durez Plastics Division's new district will include New York State, other than metropolitan New York, eastern Canada, central and western Pennsylvania, and northern West Virginia. Charles H. Foster, Jr., has been appointed manager, Buffalo sales district, for the Eastern Chemical Division; while Harry M. Dent, Jr., continues in a similar post for Durez.

THE DAYTON RUBBER CO., Dayton, O., has begun construction of a new warehouse at its Waynesville, N. C., plant. The single-story, steel frame, concrete block structure, 320 by 180 feet, will provide 58,000 square feet of floor space and will be attached to the west side of the plant to service the rapidly expanding Waynesville facilities. Raw materials and finished products will be stored in the new warehouse, which is scheduled for completion early next year.

B. F. GOODRICH TIRE CO., Akron, O., reported that for the sixth consecutive year, size 6.70-15 was by far the most popular replacement passenger-car tire sold in 1958. It accounted for 39.7% of the 61.5 million replacement passenger tires sold by the industry. The second and third most popular sizes were the 7.10-15, which accounted for 16.7% of sales, and the 7.60-15, which claimed 12.9%. Fourth and fifth places were 14-inch sizes. Size 7.50-14 provided 9.4% of replacement sales; while the 8.00-14 claimed 5.3%, the report revealed.

THE FIRESTONE TIRE & RUBBER CO., Akron, O., has acquired a process for the moisture-proofing of both natural and synthetic fibers that may have important applications in the tire, printed electrical circuit board, electrical insulation, and molded fiberboard fields. The process originally came to Firestone's attention in connection with treatment of nylon, rayon, and other fibers used in the manufacture of tire cord fabric in order to render them moisture-proof and resistant to movement of air inside tire cord bodies. Negotiations now are under way to make the new process available on a license basis to manufacturing concerns in various fields.



A NEW PARTING AGENT . . . FOR CLEAN DUST-FREE PLANTS

The way to a clean, dust-proof plant is to employ ANTIDUST. This material has been the preferred parting agent in Europe for some time. Recently, National Polychemicals has been importing ANTIDUST from Western Germany and selling it to the American rubber industry.

The current demand for this detackifier is so great that manufacture is being initiated at our Wilmington, Massachusetts, plant under an exclusive licensing agreement with Rhein-Chemie of Western Germany.

ANTIDUST is supplied in the form of a jelly-like, water soluble paste and is recommended for use as a dip solution. Stocks run through an ANTIDUST bath are coated with a shiny, tack-free film. This coating will not interfere with the knitting of the stock during vulcanization nor will it affect subsequent curing operations.

ANTIDUST is economical to use. Because of this, and because of its clean detackifying action, ANTIDUST deserves your attention. We suggest a plant evaluation now.

Write today.

NP NATIONAL POLYCHEMICALS, INC.

Wilmington, Massachusetts

News Briefs

CANADIAN INDUSTRIES, LTD., Montreal, P.Q., Canada, after five years of research, has developed a new system of bonding Terylene polyester fiber to rubber, a development which may have world-wide applications in the manufacture of tires, industrial V-belts, automotive fan belts, conveyor belting, and other mechanical goods. The new system is said to be much cheaper and more efficient than those in current use for bonding Terylene to rubber, which use comparatively expensive bonding materials that are inflammable and toxic. Recently Firestone Tire & Rubber Co., Akron, O., with which C-I-L has been cooperating closely, announced that Terylene had been found to be equal or superior to any fabrics now used in premium tires in the United States.

THE ARMSTRONG RUBBER CO., West Haven, Conn., has conducted road tests at San Antonio, Tex., which indicated that *cis*-1,4 polybutadiene and *cis*-1,4 polyisoprene tires are equal in wear to those of natural rubber and add immeasurably to the synthetic rubber field by augmenting and complementing SBR for tires and other uses. These *cis* polymers are said to be cooler running than natural rubber, thus giving better service and longer life than NR and thus opening possibilities in the truck tire field. Now with the three synthetic rubbers—all compatible—each has properties that give added advantages in certain applications.

B. F. GOODRICH TIRE CO., Akron, O., has announced a new 13-inch tire, designed especially for the new American compact cars. The new tire is considerably different from the 13-inch tires that have been made in Europe for the small foreign cars, and is now being made in the 6.50-13 tubeless size only, but BFG plans to make it in the 6.00-13 size also. It will also be available with the Trailmaker mud and snow tread. Production of the tire is now under way at the BFG Tuscaloosa, Ala., and Miami, Okla., plants for distribution throughout the country.

THIOKOL CHEMICAL CORP'S reaction motors division, Denville, N. J., has been awarded an Air Force contract for advanced development of mechanical features in prepackaged liquid rocket engines. This type of engine is a recent development in liquid rocket engines for missiles, incorporating tankage, propellants, and thrust chamber in one integrated package ready to be fired as soon as it reaches the field. The contract which covers state-of-the-art hardware refinement is under cognizance of the Wright Air Development Center of the Air Research & Development Command.

PITT-CONSOL CHEMICAL CO., Newark, N. J., manufacturer of antioxidants, reclaiming and peptizing agents for the rubber industry, has appointed R. M. Ferguson & Co. its sales representative to the Canadian rubber industry. Ferguson is located at 4201 Dundas St. W., Toronto 18, Ont., Canada.

REEVES BROTHERS, INC., New York, N. Y., has begun commercial production of low-denier polypropylene fiber, according to John E. Reeves, president. The new fiber is available both as staple and in the form of continuous multi-filament yarns. Gages of individual filaments range from 3 to 22 denier. Yarns can be supplied in a range of deniers to meet specific end-uses. Last year Reeves announced commercial production of large-diameter polypropylene monofilaments for industrial uses. The low-denier fiber now produced is expected to have a far wider range of potential uses, including textile applications.

FIRESTONE TIRE & RUBBER CO. OF CANADA, LTD., has started construction of a multi-million-dollar tire manufacturing plant on a 50-acre site in Calgary, Alta., Canada. One of the first tire manufacturing plants in Western Canada, the plant is part of an expansion program which also will include modernization of the firm's Hamilton, Ont., tire plant. Production plans for the Calgary plant call for a full line of passenger, truck, bus, farm, and implement tires. Several hundred people will be employed initially at the plant, which is slated to go into operation in the Fall of 1960.

T. C. ASHLEY & CO., INC., Boston, Mass., has been appointed exclusive sales agents in New England and New York for phenolic resins and molding compounds made by the Firestone Rubber & Latex Products Co., Fall River, Mass. The Ashley company under the direction of E. E. Ross, president, will cover the shoe trade, paint and varnish trade, paper field, electronics field, lumber industry, brake lining industry, and molders of phenolic resins.

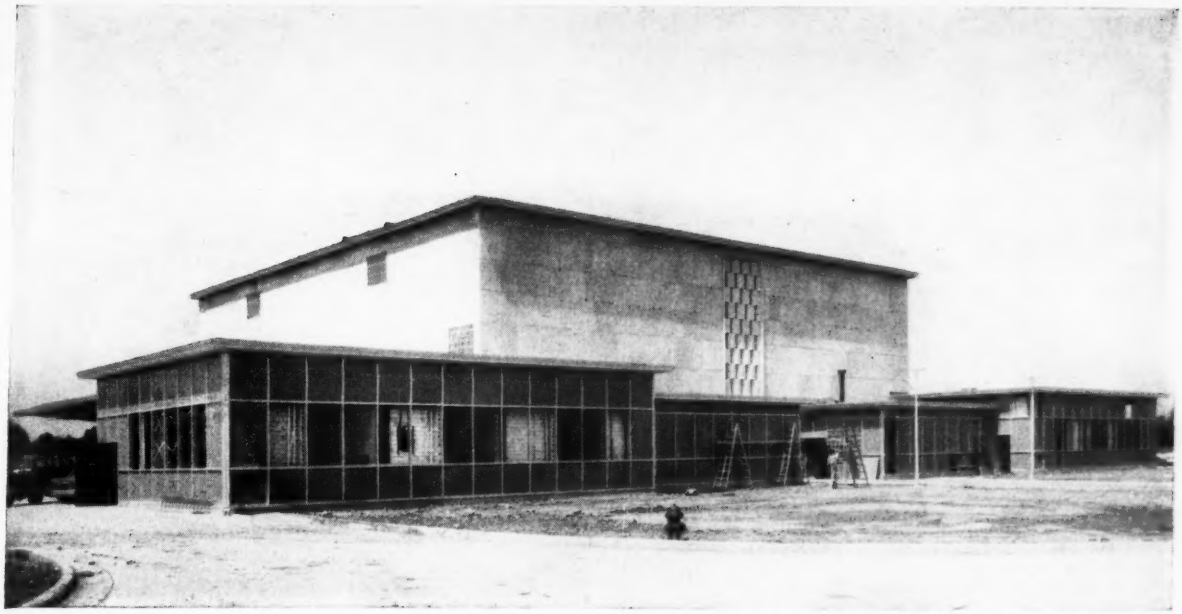
THE RUBEROID CO., New York, N. Y., recently announced that its board of directors has approved, subject to the subsequent approval of the stockholders, an agreement between Ruberoid and The Mastic Tile Corp. of America. When the agreement is consummated, Ruberoid will acquire the net assets and business of Mastic Tile in exchange for 290,000 shares of Ruberoid's capital stock. A meeting of Ruberoid stockholders to take action on the approval of the agreement was scheduled for September 29, 1959.

NATIONAL POLYCHEMICALS, INC., Wilmington, Mass., has developed a new blowing agent, designated Expandex 177, which is now available in research quantities to the rubber and plastics industries. Expandex reportedly decomposes in the temperature range of 240-250° C., some 50° C. higher than any nitrogen-releasing agent presently available. It is expected that Expandex 177 will find wide application as a blowing agent for high melting polymers such as linear polypropylene, high-density polyethylene, and Nylon 6 (caprolactum) resins. This new blowing agent is also recommended for expanding rigid and semi-rigid polyvinyl chloride, as well as elastomeric materials.

THE GOODYEAR TIRE & RUBBER CO., Akron, O., reports that the 13-inch tire for the new small American cars now going into production required a complete engineering redesign, not merely a change in size. Goodyear, which has been producing 13-inch tires in the United States since 1955 for foreign car imports, indicates that these tires are not satisfactory for the new forthcoming American compact cars. A new tire with lower cross-section than previous 13-inch tires and with a new tread design, which produces at least 15% more mileage on U. S. cars than previous designs, has been in volume production by Goodyear since June in two sizes, 6.00 and 6.50.

AVISUN CORP., reports that its new 20-million-pound-per-year unit for producing highly isotactic and crystalline polypropylene has gone on stream at Port Reading, N. J. The new unit, a converted polyethylene line at Koppers Co., Inc., is operated by Koppers personnel under the technical direction of AviSun, which is leasing the facilities. Initially AviSun offers two commercial grades of polypropylene: a general-purpose grade for injection molders and one for extrusion of monofilaments and fibers. Both grades are available in pellet form in 50-pound bags. AviSun, an affiliate of American Viscose Corp. and Sun Oil Co., is offering immediate delivery, and further information is available from E. N. Irish, product manager-polymers, AviSun Corp., 1608 Walnut St., Philadelphia 3, Pa.

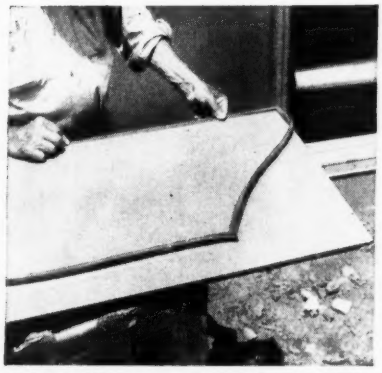
THE FIRESTONE TIRE & RUBBER CO., Akron, O., has redesigned the tire used last year at the Bonneville Salt Flats to set a new American land-speed record of 266.866 mph., enabling it to run even faster. The new smooth tread contour is designed to withstand centrifugal force of up to 75 tons, which is developed at a land speed of 300 mph, reports the company.



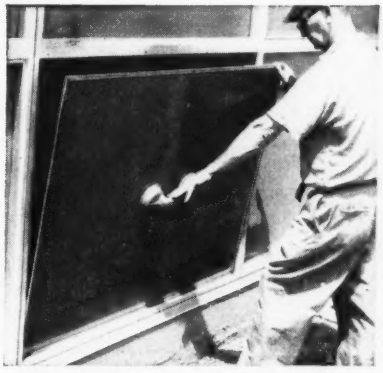
Architect: Voorhees, Walker, Smith, Smith & Haines
Contractor: Frank Briscoe

ENJAY BUTYL

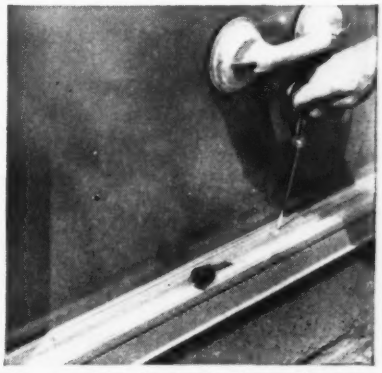
solves weather problem and seals for sure!



Easily installed — Butyl preformed gaskets can be installed on-site or in the shop. They protect panel edges during handling.



Faster glazing — installation of lights is done quickly and more efficiently when edges are protected by Butyl preformed gaskets.



All-around weather protection — the superior resistance of Butyl to ozone, sunlight, heat and moisture provides a sure seal.

Modern mullion, sill and transom design requires highly efficient sections that insure a reliable sealing job. Low-cost Enjay Butyl rubber enables the design of trim, neat window details – provides a permanent weather-tight seal. In this application Butyl does a better job than conventional rubbers because Butyl gives superior resistance to ozone, sunlight, heat and moisture. This means Butyl resists cracking, crazing and loss of elastic properties.

Butyl preformed gaskets and spacers installed in this large research center located at Florham Park, N. J. were manufactured by Pawling Rubber Corp., Pawling, N. Y. For more information how Butyl rubber can help solve your design problems, contact your nearest Enjay office.

Enjay's extensive laboratories and expert staff are always glad to provide technical assistance.

EXCITING NEW PRODUCTS THROUGH PETRO-CHEMISTRY

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ENJAY® BUTYL

DEWEY & ALMY CHEMICAL DIVISION, W. R. Grace & Co., Cambridge, Mass., plans to acquire the assets of Endura Corp., Quakertown, Pa., and the stock of The Vellumoid Co., Worcester, Mass. The acquisition, approved in principle by Grace's board of directors, is subject to final audit and court license. Endura makes pressure-sensitive tape backings and latex-impregnated tape backings and related products. Vellumoid is a leading manufacturer of non-metallic gaskets, which include impregnated fiber gaskets and packing and latex-impregnated materials. Dewey & Almy plans to use the acquisitions as part of its Polyfibron division, headed by Russell L. Haden, Jr., general manager. Dewey & Almy also anticipates continuing development of existing product lines and expansion of facilities to increase production at Vellumoid.

M. L. SNYDER & SON, INC., Philadelphia, Pa., manufacturer of rubber sundries, proof goods, etc., has entered the safety shoe manufacturing field with the recent cash purchase of P. J. Noebel Co., Brooklyn, N. Y., a leading firm in its line which manufactures boots, sandals, and similar safety footwear. Noebel's machinery and equipment have been transferred to Snyder's No. 4 plant in Philadelphia, and production commenced there September 1.

THE ST. JOSEPH LEAD CO, New York, N. Y. has appoined R. E. Carroll, Inc., Trenton, N. J., sales representatives for its lead-free zinc oxides in eastern New York and western Connecticut. Carload and truckload shipments will be made as before, directly from the company's plant at Josephtown, Pa., and warehouse stocks will be maintained in Brooklyn in order to serve less-than-carload customers. R. E. Carroll, Inc., has been St. Joe's sales representative in northern New Jersey for the past four years.

CROCKER, BURBANK PAPERS, INC., Fitchburg, Mass., is offering a new silicone-coated release paper said to have high tensile and high heat resistance for use as a wrap or carrier on the rubber industry. Designated "Stick-Not," the paper is said to provide needed characteristics as a carrier for calendered and unvulcanized rubber. It is also reported that the paper is well suited for packaging sticky products such as camel back, unvulcanized rubber, hot melts. It is an excellent interleaf for rubber blankets, tape rolls, rubber heels, etc. It is being produced in rolls 83 inches wide and in weights ranging from 30 to 80 pounds. Special types are also available to meet special requirements. Complete details and specifications can be obtained from the manufacturer.

THE CAN-TITE RUBBER CORP., Inwood, L. I., N. Y., has been named eastern sales distributor for Churchill Chemical Corp., Los Angeles, Calif. This appointment makes available to eastern electronic and cable manufacturers a full line of Q. P. L. qualified electrical potting compounds, cable molding compounds, sealants, encapsulating compounds, insulating and fungus protective compounds, qualified under U. S. Government specifications. These products range from resinous, rubber, epoxy based materials to silicone and Thiokol based sealants. Technical service will be rendered by A. J. Chafetz and H. W. Nagle, both with Can-Tite. It is also planned to institute a reserve of prepacked, premixed, frozen tubed cartridges at eastern locations for quick delivery to the job site. This will eliminate waste in the use of two-component adhesives and sealants. Literature describing the new products is available from Can-Tite and Churchill Chemical.

THE GOODYEAR TIRE & RUBBER CO., Akron, O., reports that karting, a new craze that consists of racing tiny cars on home-made tracks, has created an unprecedented boom in sales of small pneumatic tires. Started as a children's fad in California less than two years ago, the new sport has caught the fancy of adults as well. A kart consists mainly of a bucket seat, welded to a tubular steel frame, that rolls on small pneumatic tires and is powered by a lawnmower engine. Goodyear, in addition to pushing production to meet increasing demands for small pneumatic tires, has started a development effort to produce special tires designed for kart racing.

NEWS about PEOPLE

Kenneth Z. Zonsius has been named to represent the National-Standard Co., Niles, Mich., a principal supplier of wire products and machinery to the rubber industry. He will be based in Akron, O., and will cover the rubber industry in Ohio and western Pennsylvania. He was previously district sales manager for Roadway Express Agency, St. Louis, Mo., having been with that firm nine years.

Willis H. Edmund, well-known booster of recreational and other community activities has been appointed executive consultant to The Goodyear Tire & Rubber Co., Akron, O. In this newly created position he will fulfill public speaking engagements at important functions throughout the nation and, in addition, will play an important role in Goodyear's external public relations activities. Edmund formerly served as director of recreation for Goodyear-Akron, a position he held since 1944.

John A. Aron has been appointed assistant export manager of The General Tire & Rubber Co., Akron, O. Aron, who has had 30 years' experience in the tire export business, will headquarter at General's Akron offices. He was formerly associated with U. S. Rubber International.



R. A. Gregg

Pach Bros., N. Y.

Robert A. Gregg is the new research manager of the textile division, United States Rubber Co., Wayne, N. J. Formerly acting assistant head of synthetic rubber research at the firm's Research Center in Wayne, Dr. Gregg is now responsible for long-term research work in fibers, treatments, and chemical modifications of textiles. Textile division development and technical service at Winnsboro, S. C., and all plants will continue under the direction of S. H. Sherman, development manager.

John V. Hallett becomes director of research for the pigment color division, Imperial Color Chemical & Paper Corp., Glens Falls, N. Y. Since 1951 he served as assistant to the technical director.



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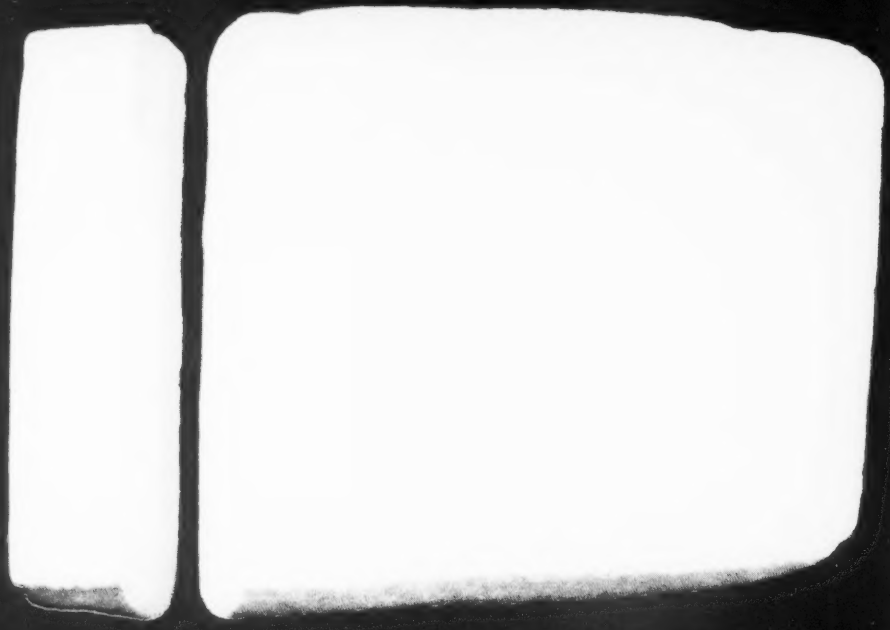
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E. G. Ronsick



J. F. Carraher

J. F. Carraher, A. K. Hoge, and **E. G. Ronsick** have been assigned new positions in the chemical division, The Goodyear Tire & Rubber Co., Akron, O. Carraher, former senior sales engineer in the plastics department, has been named to the same position in the rubber and rubber chemicals department. He will be responsible primarily for technical sales service of rubber chemicals. Hoge, former special representative in the division's Boston district, has been transferred to the Hartford district. He will be replaced in Boston by **R. S. Savage,** senior sales engineer in the division's coatings department. Ronsick, former sales engineer in the rubber and rubber chemicals department, has been appointed sales representative in the Chicago district.

Lyle E. King becomes the second assistant director of sales, elastomer chemicals department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. **Elbert S. Latimore** succeeds King as manager of elastomer sales. **Andrew W. Ballentine,** a member of the sales promotion group, succeeds Latimore as manager of sales promotion. In 1954, King was named market research manager for the rubber chemicals division (now the elastomer chemicals department) and in 1957 was appointed planning manager and a year later manager of elastomer sales. Latimore joined Du Pont's advertising department in 1945; in 1956 he became product group manager responsible for the advertising of the pigments and polychemicals departments and in 1957 was named manager of sales promotion for the elastomer chemicals department. Ballentine started with Du Pont in 1950; in 1956 he was appointed product information specialist in the public relations department and assigned to the elastomer chemicals department and in 1958 was transferred to the sales promotion group of that department.

C. R. Conklin has been named general sales manager of The Lee Rubber & Tire Corp.'s Republic Rubber Division, Youngstown, O. Conklin, formerly eastern district manager for Republic, assumes the post following the retirement of **G. L. Smith.**



A. K. Hoge



R. S. Savage

Elwood W. Phares has been appointed sales manager of Cary Chemicals, Inc., East Brunswick, N. J., producer of polyvinyl chloride resins and polyvinyl chloride-vinyl acetate compounds. Previously he had been manager of the market and commercial development department, Velsicol Chemical Corp. Prior to that he had been with Lederle Division, American Cyanamid Co., where he was responsible for market research and trade analysis for new products, packaging, and pricing studies.

William W. Lewellyn has been appointed merchandising manager, according to **L. C. Pape,** vice president of The Dayton Rubber Co.'s foam division, Asheville, N. C. Prior to joining Dayton Rubber, Lewellyn was vice president of Firestone's Rubber & Latex Products Co.'s Fall River, Mass., plant.

Thomas H. Goodgame recently rejoined Godfrey L. Cabot, Inc., Boston, Mass., as a chemical engineer in the process and engineering section of the new products research department. From his initial employment in 1953, Dr. Goodgame worked for Cabot for about two years and later in the research and development department of Texas Butadiene & Chemical Corp. **Fred Nadherny,** administrative assistant to Owen J. Brown, Jr., vice president and director of sales for Cabot, has been given a special assignment to organize commercial entry into a newly developed field. **Samuel B. Coco, Jr.,** of Cabot's Akron, O., sales office, will transfer to the Boston office as administrative assistant to the director of sales. He has been a salesman in Akron since January, 1956. **William J. McNeil,** group leader in special blacks technical service at the Cambridge research laboratories, is transferring to the Boston office as sales assistant in the special blacks department. **Joseph P. Hall, Jr.,** replaces McNeil as group leader in the special blacks technical service. **George P. McGonigle, Jr.,** sales assistant in the special blacks department in the Boston office, will transfer to the Chicago office as a carbon black sales representative. He joined Cabot in 1955 as a member of the traffic and shipping department.



E. W. Phares



J. H. LaFollette

J. H. LaFollette has joined Marbon Chemical Division, Borg-Warner Corp., Washington, W. Va., as sales-service engineer. Formerly he was affiliated with United States Rubber Co., as manager, sales production coordination for the mechanical goods division.

W. P. Dunlap has been made manager of Mobay Chemical Co.'s plant at New Martinsville, W. Va., according to **J. R. Eck,** president. Dunlap succeeds **Donald J. Miller,** Mobay plant manager since 1954, who has accepted a position with Monsanto Chemical Co.'s plastics division, Texas City, Tex. **C. R. Morton** will succeed Dunlap as production superintendent.

Phelps Trix, manager of the market development department, becomes director of the product development department, research division, Wyandotte Chemicals Corp., Wyandote, Mich. **Kurt C. Frisch** has been appointed director of the polymer research department, research division. **John Worrell,** manager of public relations and communications, returns to the research division as manager of market development, succeeding Dr. Trix. The polymer research department and the product development department are newly formed departments in the research division.

J. P. Haworth, H. C. Evans and **G. H. Lowden** have been assigned new posts with The Enjay Co., Inc., New York, N. Y. Haworth, former eastern division manager, replaces **P. L. Richards** as assistant sales manager. Richards has taken a new post with Esso Export Corp. Evans, former Akron district manager, replaces Haworth, and Lowden, representative in charge of Enjay's Detroit office, advances to Akron district manager.

Grant E. Stueber has been named manager of chemical process development at the Avon Lake (Ohio) Development Center of B. F. Goodrich Chemical Co., a division of The B. F. Goodrich Co. Stueber, formerly a development supervisor at the installation, joined BFG in 1942 as an assistant technical man in the research division.

News about People

Harlan J. Hauser becomes manager of field sales, succeeding **D. Wheeler Clark,** for Farrel-Birmingham Co., Inc., Ansonia, Conn. Hauser has also been appointed to the company's management committee and has been transferred to the general offices in Ansonia. He joined the firm in 1941 and for the past 2½ years has been assistant sales manager of the Consolidated Machine Tool Division and sales manager of the Watson-Stillman Press Division at Farrel's Rochester plant.

Lloyd D. Treleaven and **Alden H. Davis** have been appointed to new positions with Columbian Carbon Co., New York, N. Y., in the carbon black and pigment division. Treleaven becomes manager of rubber technical service for the South, Southwest, West Central, and Canadian areas. He was in charge of the eastern area. Davis becomes manager—rubber technical service, eastern area, following two years as technical service engineer at the firm's affiliated Brazilian operation in Sao Paulo. Both men will headquarter in New York.

Buell Geib, formerly with The W. W Henry Co., has joined Convair, San Diego, Calif.

Taylor Evans becomes manager, market research, for the Naugatuck Chemical Division of Dominion Rubber Co., Ltd., headquartering in the Elmira, Ont., Canada, offices. Dr. Evans will be responsible for market research studies for new organic chemicals in Naugatuck's expansion program, as well as market studies for rubber chemicals, agricultural chemicals, plastic resins, and organic intermediates presently in production.

Brady A. Fortney becomes senior development engineer in the chemical materials development department of the Goodyear Tire & Rubber Co.'s chemical division, Akron, O., according to **M. E. Wendt,** department manager. Prior to joining Goodyear, Fortney worked primarily in the field of latex foam. He will continue to work in the areas of latex foam development in his new post with Goodyear.

Howard Fisher, formerly with W. J. Voit Rubber Co., Los Angeles, is now chief chemist at Parker Seal Division, Culver City, Calif.

John Robert Clark, Jr., has joined the Washington, D. C., office of Thiokol Chemical Corp. He will work on matters dealing with technical and contractural liaison with various agencies of the Department of Defense and with prime contractors having major rockets systems from the government.



H. J. Hauser



A. H. Davis



L. D. Treleaven



R. H. Hoffman

Robert H. Hoffman has been named sales representative in the New York district for The Goodyear Tire & Rubber Co.'s chemical division. He will be concerned primarily with sale of Pliolite resins to the paint and coatings industries throughout the New York, New Jersey, and Pennsylvania areas. Previously he had been a technical and sales representative in the chemical industry, handling organic chemicals in territories around Buffalo, N. Y., and Newark, N. J.

Mortimer Goldman, formerly with Regency Rubber Product, Gardena, Calif., has joined Kraco Industries, Compton, Calif.

Clyde H. Walden has been appointed director of quality control for The General Tire & Rubber Co., Akron, O. He succeeds **Don L. Dewing,** who has returned to Aerojet-General Corp., General's rocket and missile subsidiary. Dr. Walden, who started with General Tire two years ago as divisional quality engineer, previously had been manager of quality control for National Lead Co. of Ohio.

Robert W. Bainbridge is now assistant supervisor of sales engineering for molding compounds at the Durez Plastics Division, Hooker Chemical Corp., North Tonawanda, N. Y., and reports to Edward F. Borro, Sr. His successor as molding compound salesman in the Division's eastern territory, with headquarters in New York, N. Y., is **Robert M. Stroman,** according to **Alfred W. Hanmer,** Division sales manager, who made both announcements.

Ross Ellworth Wilson, former vice president and general manager of Firestone Plantations Co. in Liberia, has been awarded by the Netherlands Government the decoration Commander in the Order of Orange Nassau in recognition of his distinguished service to Dutch people living in Liberia. Jhr. G.C.D. Hooft Graafland, Netherlands Consul General at Chicago, presented the decoration to Mr. Wilson at a recent ceremony. Wilson retired from Firestone in 1958.

Fred R. Piermattei becomes commodity sales manager of the newly formed Royalene yarn department, United States Rubber Co., with sales headquarters at Providence, R. I. The new department is part of the firm's footwear and general products division. U. S. Royalene is the trade name for the polyethylene and polypropylene fibers now manufactured in Providence as monofilaments, multifilaments, and special-shape extrusions.

Charles E. Brookes is now manager of marketing of the organic chemicals division, Dewey & Almy Chemical Division, W. R. Grace & Co., Cambridge, Mass. He had been organic chemicals sales manager. In his newly created position, he will be responsible for all marketing functions of the Division, including sales, market research and development, sales promotion, advertising, and publicity.

John G. Augenstern, formerly of Rubatex Division, Great American Industries, Inc., has joined Kirkhill, Inc., Downey, Calif. He is working primarily on sponge rubber.

Clarence H. Sigler, Jr., former technical sales representative in the Chicago area, has been appointed Vibrathane polyurethane commodity sales manager for the Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn., according to **Harold M. Parsekian,** general sales manager. Sigler replaces **Arnold Rodde,** who has been named a district sales manager for the Texas-U. S. Chemical Co., a firm jointly owned by U. S. Rubber and The Texas Co. **C. M. Butler,** research chemist in Naugatuck Chemical's Gastonia, N. C., latex compounding plant, has been named to Sigler's former post in the Chicago district sales office.

Edward H. Hunnicutt, manager of The Firestone Tire & Rubber Co.'s tire manufacturing plant in Los Angeles, Calif., has been made general factory manager of the organization's plants in Pottstown, Pa. Named general factory manager of the Los Angeles plants is **Fred L. Hopper,** who has been succeeded as director of tire production planning and distribution by **W. W. Thies,** the assistant director.



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News about People

J. R. Corbin has been appointed sales service manager by Marbon Chemical Division, Borg-Warner Corp., Washington, W. Va. Previously he had worked in technical service and sales capacities with Firestone Plastics Co. and as production engineer with tungsten & chemical division, Sylvania Electric Co.

John S. Saviello has been appointed technical sales representative for the eastern seaboard area for Marbon Chemical Division, Borg-Warner Corp., Washington, W. Va. In his new assignment he will represent Cycolac ABS plastic resin, and other Marbon products, contacting both end-use manufacturers and basic processors. Saviello and **R. E. Smith** will work together in the area, with Saviello concentrating his effort on northern New Jersey and New York, N. Y.

Robert W. Penn and **Louis L. Wood** have been appointed research chemists at the Washington Research Center by the W. R. Grace & Co. Research Division, Clarksville, Md. Dr. Penn was previously associated with Du Pont as a research chemist engaged in the study of physical and structural properties of polyamides. Dr. Wood will be engaged in organic research at the Center.

Homer C. Wilson has been elected a vice president of Texas Butadiene & Chemical Corp., Houston, Tex. He will continue to serve as manager of operations, a position to which he was recently appointed. He joined TB&C in 1956 and served as director of supplies until his recent promotion.

James B. Steen and **Dale DeBlander** have been assigned to the sales department of Neville Chemical Co., Pittsburgh, Pa., as technical representatives, and **David N. Clark** has been reassigned as West Coast representative. Steen has been assigned to the Pittsburgh, Pa., Baltimore, Md., and West Virginia areas. DeBlander will serve customers in Ohio, southern Indiana, Kentucky, and Detroit. Clark, formerly with Neville's technical service department, will now be headquartered in Anaheim, Calif., where the firm's newly built plant is located.

Finis C. Whitfield is now a sales representative for B. F. Goodrich Chemical Co., Cleveland, O., according to W. D. Parrish, manager of Hycar and rubber chemical sales. Whitfield will headquarter in Cincinnati, O., and will service the area of southern Ohio, southern Indiana, Kentucky, and Tennessee. He joined BFG in 1942 and in October, 1955, was assigned to the Cleveland main office of BFG Chemical as a product engineer.



Paul Vincent — Pach Bros., N.Y.

J. R. Corbin — M. J. Delehaunty



J. S. Saviello — H. Davis, Jr.



H. C. Wilson — J. B. Steen



D. DeBlander — D. N. Clark

Fred J. Bueche has joined the University of Akron's Institute of Rubber Research, Akron, O., as research associate with academic rank of professor. Dr. Bueche is a distinguished rubber scientist who had been with The University of Wyoming as a professor of physics since 1954. His experience includes also teaching and research in chemistry and physics at Cornell and employment as a physicist at Rohm & Haas Co. Professional and scientific journals have published more than 30 of his articles since 1948.

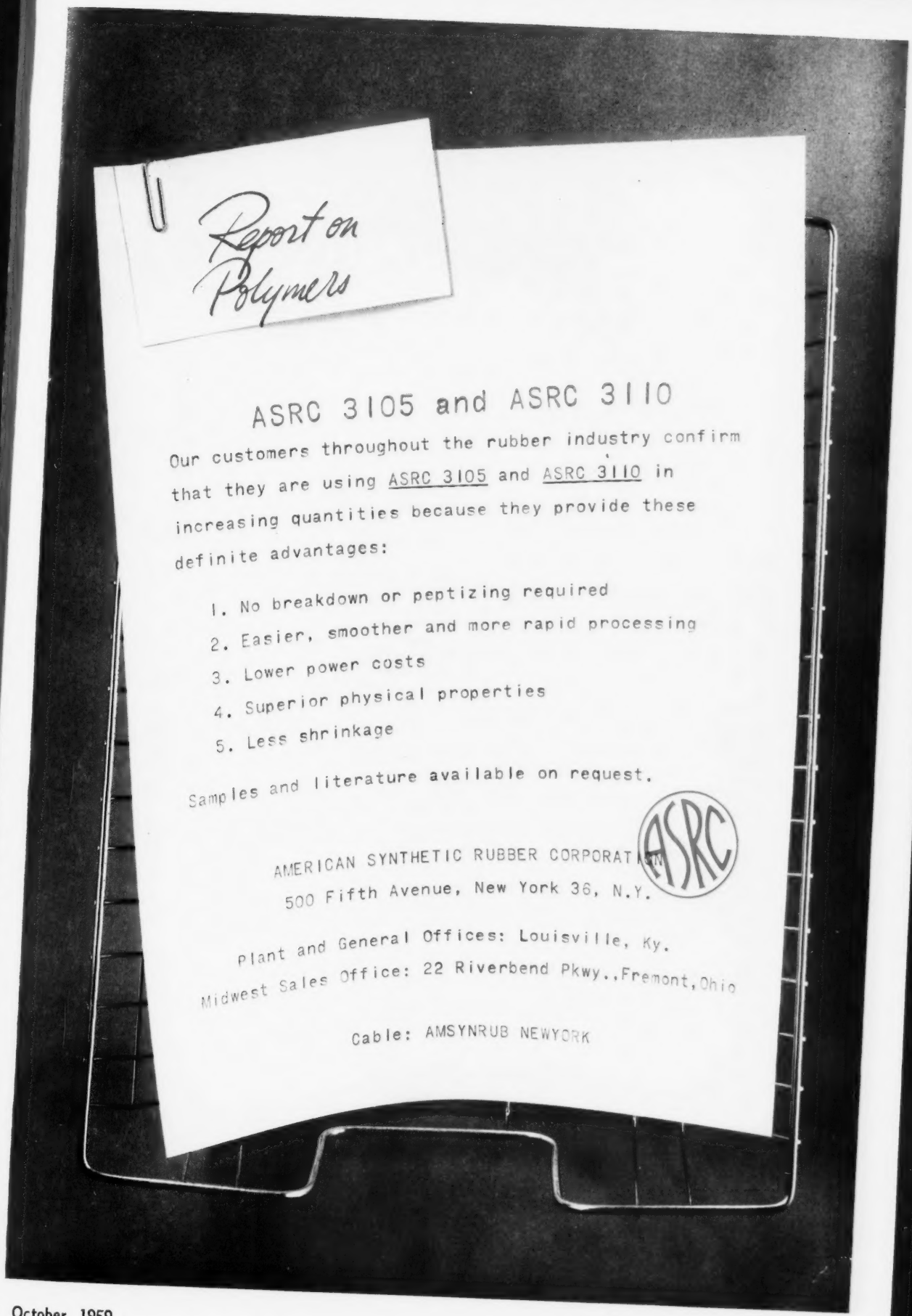
Henry Davis, Jr., has been made field sales manager of the mechanical goods division, United States Rubber Co. He replaces **Matthew J. Delehaunty,** recently named to the newly created post of market planning manager of the division. Davis formerly was eastern regional manager for the division, operating out of the Baltimore branch. He will now direct sales activities from the New York, N. Y. headquarters. **Douglas M. Smith** has been named as Davis' successor as eastern regional manager, but will operate out of the company's Passaic N. J., branch. Delehaunty in his new position will be responsible for expansion of the firm's market research facilities in the mechanical goods field and coordination of that division's product planning and distribution. He will be stationed in the New York headquarters.

Alfred E. Van Wirt has been elected executive vice president of The Imperial Color Chemical & Paper Corp., Glens Falls, N. Y., manufacturer of colors for the rubber and other industries. He has been vice president and technical director of the firm.

Jack E. Steiner and **Daniel V. Pompilio** are new technical sales representatives for Mobay Chemical Co., Pittsburgh, Pa., to serve manufacturers of urethane foams, elastomers, and industrial coatings, according to **J. D. Mahoney,** director of marketing. Steiner is at Mobay's Akron, O., district sales office. He joined Mobay in 1955 as a technical service engineer and supervised the installation of German-built urethane foam equipment. Pompilio has been assigned to Mobay's eastern sales district, with headquarters in New York, N. Y. He was previously a sales representative with the Arizona Chemical Co., a subsidiary of American Cyanamid Co.

Robert Woolsey has been appointed assistant chemist at Griffith Rubber Mills, Portland, Oreg., according to **Norman Johnson,** president. Woolsey will work under Chief Chemist **Lloyd Logsden.** For the last three years Woolsey worked in the technical laboratory of Shell Development Co., Torrance, Calif.

Wallace B. Jensen, Jr., formerly with the purchasing department of Owens Corning-Fiberglas, has been appointed purchasing agent of The Burke Rubber Co., San Jose, Calif. Also, **William Warner** has been named chief inspector, quality control department, for Burke. He previously was with the Atomic Energy Commission, serving first with the test division, Eniwetok Island, and more recently with the source supply department, Los Angeles.


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News about People

W. Paul Moeller, former sales manager of the plastics division, Celanese Corp. of America, has joined AviSun Corp., Philadelphia, Pa., as manager, special projects, according to **Chalmer G. Kirkbride,** AviSun president. AviSun, an equally owned affiliate of American Viscose Corp. and Sun Oil Co., was formed earlier this year to manufacture and market polypropylene polymer, film, and fiber.

J. A. Bailey, Jr., has been named manager of hydraulic hose sales for the Goodyear Tire & Rubber Co. and has been sent to the company's new hose plant at North Chicago, Ill. **D. E. Harrington** has been appointed sales engineer for the newly formed hydraulic hose sales department. The rising demand for hydraulic hose from the automotive, aircraft, oil, mining, metals, and machine industries was responsible for the assignments, it was said.

Robert A. Ruehrwien and **John D. Calfee,** section leaders with the research department of Monsanto Chemical Co.'s research and engineering division, Dayton, O., have been advanced to assistant directors of that department. Dr. Ruehrwien will be in charge of the inorganic, physics, physical chemistry, and analytical research groups. Dr. Calfee will assume responsibility for research in polymer synthesis and evaluation.

Alexander Freeman and **William Homer, Jr.,** have joined the development department of National Polychemicals, Inc., Wilmington, Mass., and will be active in the program of the recently formed plastics division. Freeman had previously been associated with the Synvar Corp. and with the Atlas Powder Co. Homer also had been with Synvar.

Frank Donat and **Charlotte Kraebel** have joined the chemical and plastics research department, The B. F. Goodrich Co. Research Center, Brecksville, O. Both are June, 1959, graduates and hold Ph.D. degrees in organic chemistry.

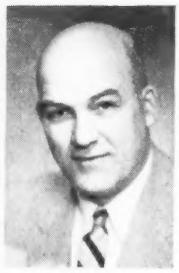
Gene Gador, formerly of Oliver Tire & Rubber Co., is now on the staff of the B. E. Dougherty Co. and will be headquartered in the San Francisco, Calif., office.

John W. Berie has been named field sales manager of the sundries sales department of B. F. Goodrich Industrial Products Co., Akron, O. BFG's sundries department includes drug, surgical, and stationers' products. For the past 14 years Berie held a variety of sales and administrative assignments with Faultless Rubber Co., Ashland, O.



Art Streib Photo

D. Montgomery



Edwyn Portrait

F. C. Williams, Jr.

Don Montgomery has been named general sales manager for the Xylos Rubber Co., a subsidiary of the Firestone Tire & Rubber Co., Akron, O. He will be responsible for sales of reclaim and FR-S synthetic rubber in California, Oregon, Washington, and Utah, headquartering in Los Angeles.





Pach Bros., N. Y.

C. H. Baldwin G. H. Callum

Charles H. Baldwin has been appointed general sales manager of manufacturers' products in the footwear and general products division, United States Rubber Co., Mishawaka, Ind. Also, **George H. Callum** has been named development manager of the division, and **Edward C. Van Buskirk** manager of the divisional laboratories. In his new position Baldwin will be responsible for sales direction of all types of foam rubber cushioning, Naugahyde plastic vinyl upholstery, Royalite plastic products, auto mats, and Ensolite vinyl sponge. Callum will direct new product development, and Van Buskirk will spearhead research in laboratories at Mishawaka, Ind., Naugatuck, Conn., Providence, R. I., and Santa Ana, Calif. **Thomas R. Grimes** becomes sales manager of Koylon foam seating, headquartering at Mishawaka.

Richard C. Henshaw is now manager of operations at Lord Mfg. Co., Erie, Pa., producer of engineered systems for vibration, shock, and noise control, and assumes overall responsibility for activities of the engineering, manufacturing, and marketing divisions. He has been with the company since 1938 and has held a succession of supervisory and managerial posts.

Fred C. Williams, Jr., has been assigned branch managership of a new general line office in Akron, O., for Wellington Sears Co. This new office, created to provide improved service in that area, will be located in the Ohio Building, 175 S. Main St., Akron 8. Williams was previously branch manager of the St Louis office. The firm's Chicago office will expand its activities to serve general line accounts in the St. Louis territory. The St. Louis Martex office will continue under the management of **Robert Engblom.** Akron accounts had been covered from the New York office by **Harold F. Proctor,** who will retire in January, 1960, after 47 years of service. Until his retirement, Proctor will work closely with Williams in a consulting capacity.

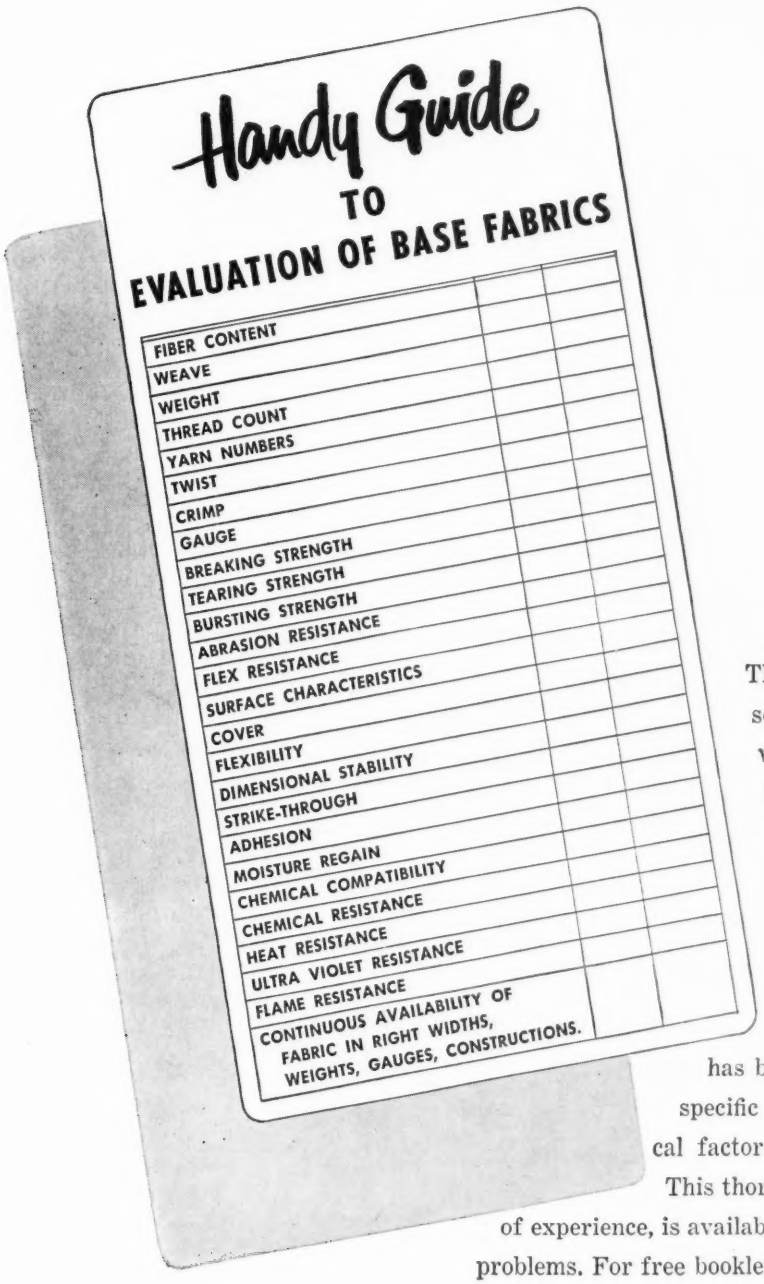
James Dowd has been made manager of marketing research for The Garlock Packing Co., Palmyra, N. Y., according to **J. B. Sewell,** vice president, marketing. Dowd will be responsible for domestic and international marketing studies covering more than 2,000 items within Garlock's nine major product lines. He was formerly assistant manager, market development department, Air Reduction Sales Co.

R. H. Strong has been appointed market development manager for Naugatuck Chemicals, Division of Dominion Rubber Co., Ltd., headquartering at the Naugatuck general offices in Elmira, Ont., Canada. In his new position he will be responsible for the initial marketing stages of new Naugatuck products in the fields of plastics resins, agricultural chemicals, and general organic chemicals and intermediates.

E. E. Eutsler has been elected president of the F. H. Maloney Co., Houston, Tex., a major manufacturer of metal, rubber, and plastic products for the oil and gas industry, according to **F. H. Maloney,** who vacated the presidency to become chairman of the board of directors. **H. B. Finch** is now secretary-treasurer, succeeding Eutsler, and both Finch and Vice President **James H. McBrien,** general sales manager, have been elected to board membership.

Eugene J. Becker has been named sales development engineer for rubber and rubber products, chemical division, The General Tire & Rubber Co., Akron, O. He has been with General Tire since 1954 and previously had been employed by American Hard Rubber for six years.

Homer Neptune has joined the purchasing department of W. J. Voit Rubber Co., Los Angeles, Calif. He had been associated with H. M. Royal, Inc.



This fictitious "guide" has been created solely to show some of the factors which often have to be considered in the selection of a base fabric. They serve only to point up one fact: that there can be *no* such thing as a put-it-in-your-pocket guide in this field. But one thing is certain: when you're guided by Wellington Sears, you know that your base fabric has been considered in the light of your specific need, and that all significant technical factors have been thoroughly examined. This thoroughness, plus more than a century of experience, is available to help solve *your* working-fabric problems. For free booklet, "Fabrics Plus," write Dept. H-10.

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WEST POINT TEXTILES

Wally Jensen has been appointed purchasing agent of Burke Rubber Co., San Jose, Calif. This position was previously held by **Carl Ebert.**

Allen E. Martin has joined the Dewey & Almy Chemical Division, W. R. Grace & Co., Cambridge, Mass., as group leader for latex and rubber applications in the organic chemicals research laboratory. He was formerly with General Latex & Chemical Corp., Cambridge, Mass.

OBITUARIES

Albert A. Somerville

Albert A. Somerville, retired, consultant to R. T. Vanderbilt Co., New York, N. Y., died September 20 of a heart attack at his home in Carmel, N. Y.

Dr. Somerville received his B.S. from DePauw University, his M.A. from the University of Illinois, and his Ph.D. from Cornell University. He taught physics at Cornell for two years following graduation and, in 1912, began his career in the rubber industry with United States Rubber Co. In 1919 he became associated with the late Robert T. Vanderbilt and originated and developed the rubber department of the Vanderbilt Company. Dr. Somerville was the first manager of the rubber department of the company and was subsequently named executive vice president. He wrote the first "Vanderbilt Rubber Handbook" and in 1931 established the "Vanderbilt News".

One of the best known men in the rubber industry, "Doc" Somerville was very active in professional societies and industry groups. He was a lifetime member of the American Chemical Society and a member of its Rubber Division and of the 25-Year Club of that Division. He was also a member of the American Society for Testing Materials. He was one of the founders of the New York Rubber Group and served as chairman of the founding meeting. He continued to be very active in NYRG activities during his long association with that Group. He was awarded a special citation by the Group for his part in the founding as well as his long service at the Group's past chairmen night held October 4, 1957. Dr. Somerville was also a member of Sigma Xi.

The deceased was a member of the Cornell Club of New York, D. K. E., and the Masons.

He was born January 28, 1883, in Milroy, Ind.

Dr. Somerville is survived by his wife, two daughters, two sons, and five grandchildren.

Funeral services were held September 22 at St. Bartholemew's chapel, New York. Interment was private.



Albert A. Somerville

Robert Badenhop

Robert Badenhop, founder and chairman of the Robert Badenhop Corp., New York, N. Y., died September 20 at a New York hospital.

Mr. Badenhop started his rubber importing career in Germany at an early age. He came to the United States in 1907 and after a short time started the company which he developed into one of the leading rubber importing firms of the nation. He helped organize the Rubber Trade Association, Inc., in 1913 and served on its board and also as president and chairman. He was elected president and chairman of the Rubber Clearing House in 1938 and served 19 years. He also helped found the Rubber Exchange of New York, of which he became a director, and he also helped form the Commodity Exchange of New York.

Mr. Badenhop was a collector of paintings and works of art and donated many items to museums throughout the country.



Potter Studios

Robert Badenhop

The deceased was also a member of the Deal Golf & Country Club, the Upper Montclair Golf Club, the Deutsche Verein, and the Liederkranz Society.

Mr. Badenhop was born in Hamburg, Germany, June 12, 1882. He became a United States citizen shortly after his arrival in this country.

He is survived by his wife, two sons, a daughter, and five grandchildren.

Funeral services were held at Campbell's, New York, on September 23, with burial at Fairmont, Newark, N. J., on the same date.

Edwin Stein

Edwin Stein, 64, chairman of the board of Stein, Hall & Co., Inc., died suddenly on August 31 in New York, N. Y. He had been associated with the company for 43 years. He was elected its president and director in 1944 and chairman of the board in March, 1948.

The son of the late Leo Stein, founder of Stein, Hall's New York operations, Edwin Stein was an important figure in developing the company's services to the textile, paper and adhesives industries.

The deceased was graduated from Yale University in 1916. He was a commissioned officer during World War I and served in France as personnel adjutant in the 10th Engineer Regiment. In 1950, shortly after the start of the Korean War, he was appointed consultant for the adhesives industry to the plastics branch of the National Production Authority's chemical division.

He was a member of the Yale Club and the Chemists Club in New York.

Mr. Stein is survived by his wife, two sons, two daughters, five grandchildren, a sister, and two brothers.



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MARKET REVIEWS

Natural Rubber

During the period under review (August 16-September 15) the government announced plans to dispose of 470,000 long tons of natural rubber, from its billion-dollar national security stockpile, over the next nine years. Disposal of the first year's quota of about 40,000 to 50,000 tons, valued at about $30 million, will begin shortly and will be completed before the end of the 1960 fiscal year ending June 30, 1960.

The General Services Administration said that this rubber is in excess of stockpile needs. The excess disposal operation would be so conducted as to avoid market disruption. Sales will be negotiated on the basis of prevailing market prices.

During this period there has been a shortage of near rubber in all the world's rubber markets. Trade sources indicated that the market in the United States has been erratic owing to (1) no rubber physicals presently available, (2) manufacturers are using rubber rapidly, (3) major users are buying through brokers, (4) the stockpile situation has cut off a normal pipeline of rubber, until Bill 707 is signed, and stockpile rubber is sold, (5) brokers are unable to obtain natural rubber.

With the rubber market in its present nervous state it is difficult to discern any real trend, and price movements are likely to be exaggerated. In spite of their present high level, prices most likely will be maintained, if not further advanced.

August sales, on the New York Commodity Exchange, amounted to 15,270 tons, compared with 15,350 tons for July contract. There were 21 trading days in August, and 21 during the August 16-September 15 period.

REX CONTRACT

	Aug. 21	Aug. 28	Sept. 4	Sept. 11
Sept.	40.60	37.25	40.00	38.50
Nov.	37.85	37.05	38.40	37.50
1960				
Jan.	36.15	35.80	36.45	35.95
Mar.	35.60	35.00	35.55	35.00
May	35.00	34.50	35.06	34.25
July	34.80	34.30	34.40	33.65
Sept.	34.55	34.10	34.10	33.35

On the physical market, RSS #1, according to the Rubber Trade Association of New York, averaged 39.5¢ per pound for the August 16-September 15 period. Average August sellers' prices for representative grades were: RSS #3, 37.76¢; #3 Amber Blankets, 37.73¢; and Flat Bark, 33.38¢.

NEW YORK OUTSIDE MARKET

	Aug. 21	Aug. 28	Sept. 4	Sept. 11
RSS #1	39.75	38.50	41.50	40.00
#2	39.25	38.13	*	39.75
#3	38.75	37.75	*	33.50
Pale Crepe				
#1 Thick	42.00	41.75	*	*
Thin	41.25	41.00	*	*
#3 Amber Blankets	39.00	38.00	*	*
Thin Brown Crepe	38.63	37.63	*	*
Standard Flat Bark	34.75	34.00	*	*

* Owing to erratic market conditions there were no prices available for these grades.

Synthetic Rubber

A new monthly high for production of synthetic rubber was established in August with 119,031 long tons, topping July's peak of 114,316 tons, according to the regular monthly report of The Rubber Manufacturers Association, Inc.

Consumption of new rubber in the United States in August totaled 137,076 long tons, compared with the 141,279 long tons in July. Consumption of all types of synthetic rubber in August was 90,236 long tons, against 93,734 in July.

Consumption by types in August, as compared with July usage, in long tons, was variable, as follows: SBR, 74,689, against 78,995; neoprene, 7,137, against 6,277; butyl, 5,540, against 6,043; and nitrile, 2,870, against 2,419.

Exports for all types dropped to 20,130 tons for August.

Trends in SBR masterbatches showed the oil-black masterbatch production slightly down to 18,042 from 18,939 tons in July. Carbon black masterbatches in contrast rose to 5,611 tons in July on the same basis. The oil-extended rubber production showed a drop of about 778 tons in August from July production.

Total new rubber consumption for the eight-month period reached 1,073,817 long tons, of which 702,137 long tons were synthetic.

Scrap Rubber

Both the Naugatuck reclaimer and the Buffalo consumer resumed operation during the August 16-September 15 period. While there was said to be a quiet market at the beginning of this period, fair business was reported for the closing week, with reclaimers taking in scrap to meet their immediate requirements. The demand for No. 1 truck peelings was improved in the Midwest. Mixed auto tubes and synthetic butyl tubes also were reported to be stronger, both in the East and the Midwest.

It is believed that conditions will hold to the present course until a clearer picture of fall business can be ascertained. The debilitating effect of the nationwide steel strike has served to cloud near-term prospects.

	Eastern Points	Akron, O.
	Per Net Ton	
Mixed auto tires	$7.00	$12.50
S. A. G. truck tires	nom.	17.00
Peeling, No. 1	nom.	26.00
2	nom.	22.00
3	nom.	19.00
Tire buffings	nom.	nom.
	(¢ per Lb.)	
Auto tubes, mixed	3.25	3.25
Black	5.75	5.75
Red	6.25	6.25
Butyl	4.75	4.75

Latex

The latex market during the August 16-September 15 period followed closely the same pattern as during previous weeks, with continued covering by some consumers of drum latex to meet their immediate needs. At the same time more interest has been shown for shipment during the next two or three months, and a moderate volume of business has been concluded.

Some inquiries for January/June shipment next year have been circulating, according to one source. With the price difference between buyers and sellers rather wide, they have at present reached little more than the tentative stage in connection with these inquiries.

There is little to report on bulk latex. With supplies for shipment during the remainder of this year now apparently exhausted, the market has become quiet, but very steady.

The continued high prices for natural latex are encouraging consumers to use a higher proportion of synthetics. This fact is borne out by the latest details of United States consumption figures.

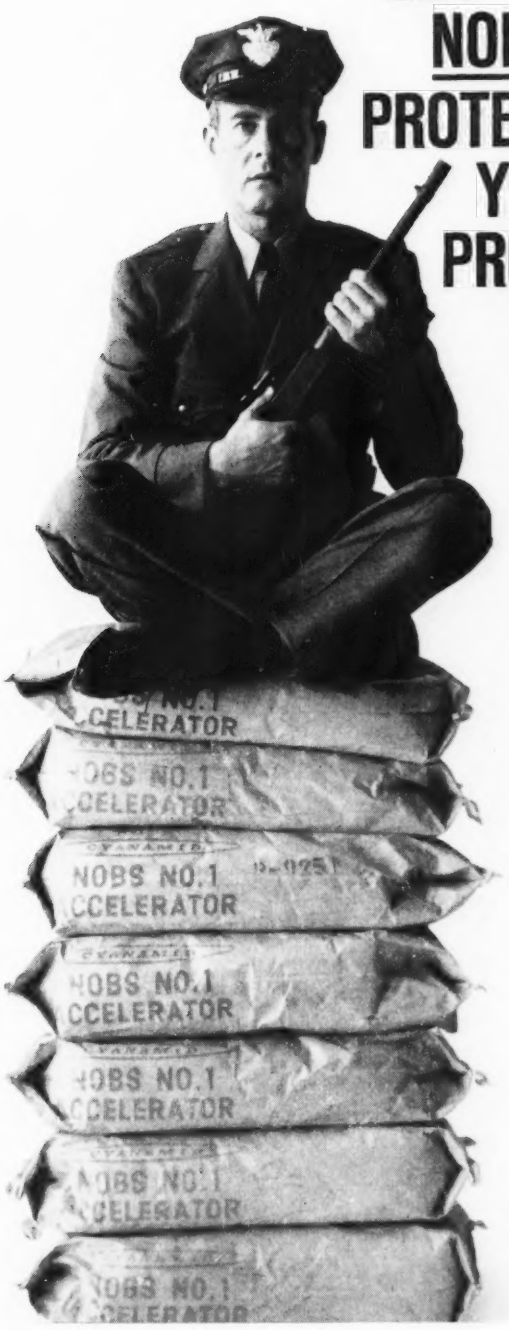
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A British source reported imports of natural latex into the United States in July amounted to 5,469 tons, compared with 7,445 tons in June, and into the United Kingdom, 1,916 tons, against 2,959 tons in June.

Prices for ASTM centrifuged concentrated natural latex, in tank-car quantities, f.o.b., rail tank car, ran about 47.88¢ per pound solids. Synthetic latices prices were 26.0 to 40.25¢ for SBR; 37 to 57¢ for neoprene; and 45 to 60¢ per pound for the nitrile types.

Final June and preliminary July domestic figures for all latices were reported by the United States Department of Commerce as follows:

(All Figures in Long Tons, Dry Weight)

Type of Latex	Production	Imports	Consumption	Month-End Stocks
Natural				
June	0	7,445	5,622	11,063
July	0	*	5,004	10,752
SBR				
June	6,730	—	6,497	7,314
July	6,871	—	5,804	6,983
Neoprene				
June	1,223	0	910	1,601
July	956	0	919	1,528
Nitrile				
June	1,196	0	1,150	2,432
July	1,279	0	940	2,761

* Not available yet for period covered.

Reclaimed Rubber

One reclaimer in the Midwest reported that the reclaimed rubber business during the August 16-September 15 period remained good, but noted that business had begun to slow down as the result of the effects of the steel strike on some of its customers. Once steel goes back into production, the demand for reclaimed rubber is expected to pick up.

Another reclaimer in the East reported that its production had been curtailed during the last two weeks of the period under review. The let-up was attributed to the fact that the tire industry has high inventories of reclaimed rubber on hand. In general, this reclaimer expects about a 15% drop in production for the final quarter of this year. Use of reclaimed rubber by non-tire users was expected to remain at a normal level, provided the steel strike has no ill effect on these users.

According to The Rubber Manufacturers Association, Inc., report, August production of reclaimed rubber was 25,000 long tons; while consumption was 22,773 long tons.

RECLAIMED RUBBER PRICES

Whole tire, first line	$0.11
Third line	.1025
Inner tube, black	.16
Red	.21
Butyl	.14
Light carcass	.22
Mechanical, light-colored, medium gravity	.155
Black, medium gravity	.085

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity, at special prices.

Rayon and Nylon

During the August 16-September 16 period domestic producers of nylon tire yarn reduced prices 9-14¢ a pound on this product.[1] As we went to press, it was reported that Industrial Rayon Corp. lowered prices of viscose tire yarns 4-5¢ a pound or about 6-8%, in what tire industry spokesmen believe is a move to offset the recent price cuts in nylon tire cord. Other leading rayon producers are studying the move by Industrial Rayon, and trade sources expect they will follow with similar price reductions on Tyrex viscose tire yarn. The price changes by Industrial Rayon bring the price of its 1100 denier Tyrex yarn down from 66¢ to 62¢ a pound and the price of its 1650 denier-type down from 60 to 55¢ a pound.

Price reductions in heavy denier Super Cordua rayon yarns used in tire cord and other industrial products were announced in September by Du Pont. The new prices, effective September 21, are: 1100 denier yarn, 62¢ a pound, down 4¢; 1650 denier yarn, 55¢, down 5¢ a pound; and 2200 denier yarn, 54¢ a pound, down 3¢. Textile rayon yarn prices, however, remain unchanged.

During mid-September The Mohawk Rubber Co., Akron, O., announced plans for switching its entire passenger-car tire production over to nylon cord, discontinuing rayon cord completely. According to Du Pont, this move will make Mohawk the first manufacturer to turn exclusively to nylon in its passenger line. H. M. Fawcett, Mohawk president, said that his firm's sales of nylon cord tires had risen from 30% of its total tire sales in 1955 to 65% in 1958.

During this review period a new yarn made of Vinylon made its debut in Japan. Polyvinyl alcohol fibers have been commonly and internationally known as Vinylon. Eventually this fiber may be produced commercially in the United States.

Otsu Rubber Co., an affiliate of Dai Nippon Spinning & Weaving Co., Osaka, Japan, is reported to have successfully produced what is believed to be the first tires constructed with this type of cord. A spokesman for the company claims that these tires are superior to either rayon-cord or nylon-cord tires.

[1] See our Sept., 1959, issue, p. 934, for details.

The announcement of the tires made of this material is significant in view of the fact that Air Reduction Co., Inc., New York, N. Y., is licensed by Kurashiki Rayon Co., Ltd., to provide this fiber in the United States and currently is importing it for sampling purposes and experimental work. Under the FTC textile labeling act, the fiber will have the official generic name of vinal, as so named by Air Reduction.

Meanwhile Otsu Rubber reports that applications for samples of the new tire cord have been received from Du Pont as well as from the (British) Dunlop Rubber Co.

Total packaged production of rayon and acetate filament yarn during August was 63,000,000 pounds, consisting of 29,100,000 pounds of high-tenacity rayon yarn and 33,900,000 pounds of regular-tenacity rayon yarn. Production for July had been: total, 65,000,000 pounds, including regular-tenacity rayon yarn, 35,300,000 pounds, and high-tenacity rayon yarn, 29,700,000 pounds.

Filament yarn shipments for August to domestic consumers totaled 63,500,000 pounds, of which 28,600,000 pounds were high-tenacity rayon yarn, and 34,900,000 pounds were regular-tenacity rayon yarn. Shipments for July had been: total, 62,100,000 pounds; high-tenacity, 29,200,000 pounds; regular-tenacity, 32,900,000 pounds.

RAYON PRICES

Tire Fabrics

1100/490/2	$0.625/$0.78
1650/908/2	.685
2200/980/2	.655

Tire Yarns

High-Tenacity	
1100/ 490, 980	.62/ .66
1100/ 490	.62/ .66
1150/ 490, 980	.59/ .63
1165/ 480	.59/ .66
1230/ 490	.59/ .63
1650/ 720	.55/ .60
1650/ 980	.55/ .58
1875/ 980	.55/ .58
2200/ 960	.54/ .57
2200/ 980	.54/ .57
2200/1466	.64
4400/2934	.60
Super-High Tenacity	
1650/ 720	.55/ .60
1900/ 720	.58

NYLON PRICES

Tire Yarns

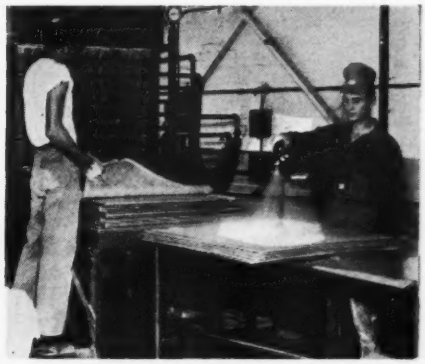
840/140	1.06
1680/280	1.03

Industrial Fabrics

During the last part of the August 16-September 15 period the industrial grey cotton goods market was under the post-Labor Day influence that accounted for little heavy volume buying. The situation, however, was in a state

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Water-dilutable emulsions, solvent soluble fluids, greaselike compounds, different forms for different uses. Whatever you make . . . if it's molded of rubber — you can count on Dow Corning development engineers to formulate a silicone mold lubricant that'll release it efficiently and economically!

More Cost-Saving Silicones . . . In other areas of the rubber industry, too, Dow Corning Silicones have proved to be time and money savers: as electrical insulation



for mill and mixer motors; as anti-adhesive coatings for bags, containers and interleaving; as heat-resistant paints that also resist weathering and corrosive atmospheres; as lubricants for ball bearings; and as Silastic® gums and bases for compounding silicone rubber stocks to meet severe performance requirements. For more information about silicone release agents or other silicones for the rubber industry, write Dow Corning, Dept. 9422.

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Toys and dolls, mats and heels, tires and tile — all kinds of rubber products — pop out cleanly, time after time after time, from molds lubricated with Dow Corning Silicones. These silicone release agents give uniform stick-free release . . . assure sharp surface detail, reduce rejects to a bare minimum, increase profits.

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Easy and economical to use, Dow Corning mold lubricants are available in a variety of forms . . . for all types of rubber . . . for all types of molds.

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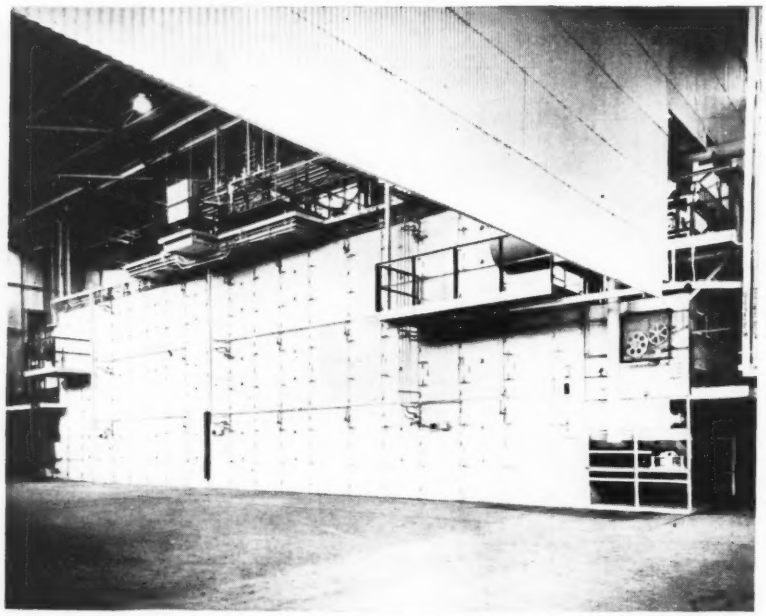


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Uniformly dried, uniformly cooled, uniformly clean rubber crumb ready for baling is assured by Sargent Dryers. The entire process is automatic. Production is high. Performance is guaranteed.

Features developed by Sargent over many years of designing and building rubber dryers include: Silicone spraying at the feed end, to help prevent caking or rolling up of the crumb; Dryer sections zoned in groups with separate temperature and humidity controls; Highly efficient airlocks between dryer and cooler compartments; Breakers and brushes to assure a clean conveyor, and to reduce maintenance time and cost; Design that solved the dust problem — collectors are not needed at exhausts; A single housing for dryer and cooler — increases efficiency, speeds the process cycle, lessens possibility of contamination of stock; Housing is covered with full height hinged doors and easily-removed panels for easiest possible cleanout, in least time; Every known safety device for protection of personnel, machine and stock; An exclusive, precision pre-assembly method that makes Sargent equipment the easiest and the quickest — and at lowest cost — of any dryer on the market to install in customer's plant.

Gas burners, safety certified of course, may be mounted on top of the dryer section for more efficient operation, easier servicing. Heat source for Sargent Dryers may also be oil, steam or electricity.

Shown above is a recently installed gas-fired, 3-pass synthetic rubber dryer with cooler. Only 2 gas burners are needed to bring this dryer up to working temperature in less than ten minutes.

Sargent experience and engineering can help you save time, money, man-hours in your drying process, producing a top quality, uniform quality product. Let us give you details.

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Market Reviews

which bordered on heavy potential contract covering incentives. Some felt that the stand-still attitude stemmed from uncertainties regarding the steel industry situation. Others viewed the market as waiting for clearer signals regarding the impetus in automobile production. Some caution was applied to appraising economic trends in the shoe, decorative, apparel, and general industrial products segments of industry.

Decorative fabrics reports show mills have good business covering wide sheetings, ducks, special weaves and sateens, drills and such-like cloths used for converting into napery. With coaters watching the pickup in small car production a great demand is awaited, to extent already in motion.

During the last week of this period, while quotations were not revised, the fairly numerous fill-in yardages carried full prices on any of the standard quality firsts.

Industrial Fabrics

Broken Twills*

54-inch, 1.14, 76x52	*yd.*	$0.52
58-inch, 1.06, 76x52		.585
60-inch, 1.02, 76x52		.5825

Drills*

59-inch, 1.85, 68x40	*yd.*	.385
2.25, 68x40		.325

Osnaburgs*

40-inch, 2.11, 35x25	*yd.*	.2275
3.65, 35x25		.1525
59-inch, 2.35, 32x26		.295
62-inch, 2.23, 32x26		.305

Ducks

Numbered Duck†

List less 45%

Enameling Ducks*

	S. F	D. F.
38-inch, 1.78 yd.	$0.3263	.3313
2.00 yd.	.275	.28
51.5-inch, 1.35 yd.	.45	.47
57-inch, 1.22 yd.	.4838	.50
61.5-inch, 1.09 yd.	.5413	.5538

Hose and Belting Duck*

Basis	*lb.*	.60

Army Duck†

52-inch, 11.70 oz., 54x40 (8.10 oz./sq.yd.)	*yd.*	.5925

Sheeting*

40-inch, 3.15, 64x64	*yd.*	.2175
3.60, 56x56		.185
52-inch, 3.85, 48x48		.235
57-inch, 3.47, 48x48		.245
60-inch, 2.10, 64x64		.365
2.40, 56x56		.3275

Sateens*

53-inch, 1.12, 96x60	*yd.*	.6275
1.32, 96x64		.56
57-inch, 1.04, 96x60		.615
58-inch, 1.02, 96x60		.68
1.21, 96x64		.61

Chafer Fabrics*

14.40-oz./sq.yd. P.Y.	*lb.*	.71
11.65-oz./sq.yd. S.Y.		.61
10.80-oz./sq.yd. S.Y.		.65
8.9-oz./sq.yd. S.Y.		.67
40-inch, 2.56, 35x25		.25
60-inch, 1.71, 35x25		.435

* Net 10 days.
† 2% 10 days.

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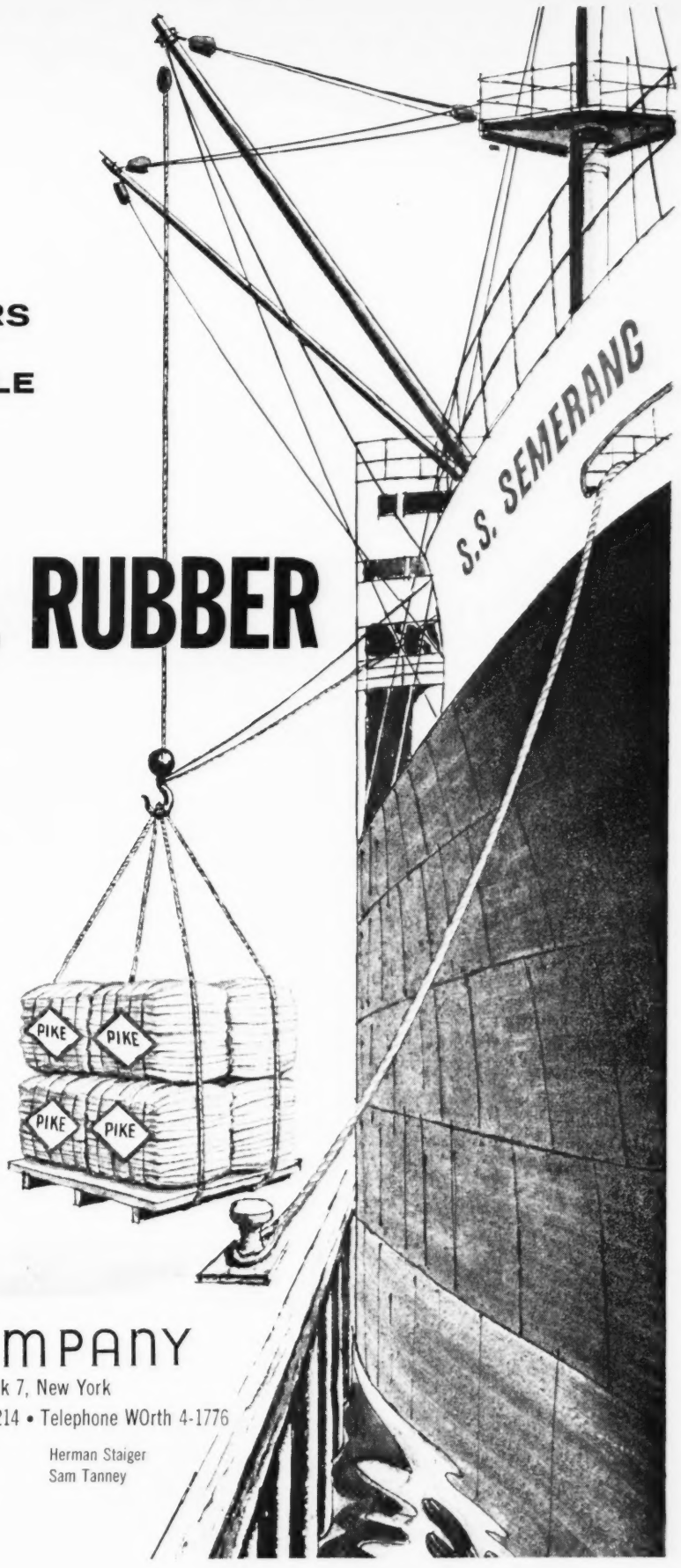
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STATISTICS of the RUBBER INDUSTRY

U.S.A. Imports and Production of Natural and Synthetic Latices

(Long Tons, Dry Weight)

Year	Natural	SBR	Neoprene	N-Type	Total Synthetic	Total Natural & Synthetic
1958						
Sept.	5,034	6,165	1,075	1,173	8,413	13,447
Oct.	6,994	7,617	1,170	1,308	10,095	17,089
Nov.	4,074	7,307	1,156	1,205	9,668	13,744
Dec.	7,950	6,891	986	1,033	8,910	16,860
1959						
Jan.	8,574	7,801	1,049	1,104	9,954	18,528
Feb.	5,746	7,578	998	1,161	9,737	15,483
Mar.	7,039	8,587	1,013	1,269	10,869	17,908
Apr.	6,342	6,730	1,301	911	8,942	15,284
May	6,007	6,583	1,146	1,156	8,885	14,892
June	7,445	6,730	1,223	1,196	9,149	16,594
July*	....	6,871	956	1,279	9,106	....

* Preliminary.
Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.

U.S.A. Consumption of Natural (Including Latex) and Synthetic Rubber (Long Tons)

Year	Natural	SBR Types	Butyl	Neoprene	N-Type	Total Natural and Synthetic
1958						
Sept.	44,743	65,256	4,725	6,647	2,538	123,909
Oct.	48,875	73,699	4,982	7,378	2,759	137,693
Nov.	43,031	66,294	4,419	6,448	2,562	122,754
Dec.	46,891	71,731	4,897	6,955	2,606	133,080
1959						
Jan.	49,913	74,222	5,359	7,198	2,857	139,549
Feb.	47,345	72,558	5,256	6,885	2,694	134,738
Mar.	51,991	78,792	5,687	7,444	3,166	147,080
Apr.	41,483	64,547	4,758	7,493	2,941	121,222
May	38,777	60,870	3,978	6,914	2,853	113,392
June	47,786	76,065	5,484	7,083	3,063	139,481
July*	47,545	78,995	6,043	6,277	2,419	141,279

* Preliminary.
Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.

U.S.A. Stocks of Latex

(Long Tons, Dry Weight)

Year	Natural	SBR	Neoprene	N-Type	Total Synthetic	Total Natural & Synthetic
1958						
Sept.	12,482	6,842	1,354	2,096	10,292	22,774
Oct.	10,324	7,129	1,365	2,229	10,723	21,047
Nov.	8,795	7,810	1,498	2,530	11,838	20,633
Dec.	8,900	7,672	1,563	2,519	11,754	20,654
1959						
Jan.	10,025	7,822	1,551	2,418	11,791	21,816
Feb.	10,482	7,753	1,488	2,535	11,776	22,258
Mar.	9,375	8,209	1,441	2,670	12,320	21,695
Apr.	8,599	7,859	1,458	2,379	11,696	20,295
May	9,718	7,917	1,417	2,398	11,732	21,450
June	11,063	7,314	1,601	2,432	11,347	22,410
July*	10,752	6,983	1,528	2,761	11,272	22,024

* Preliminary.
Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.

U.S.A. New Supply, Consumption, Exports, and Stock of Reclaimed Rubber

(Long Tons)

Year	New Supply	Consumption	Exports	Stocks
1958				
Sept.	22,641	21,771	1,005	26,676
Oct.	26,524	23,563	1,028	27,340
Nov.	22,450	21,271	1,051	27,680
Dec.	24,800	23,285	841	29,063
1959				
Jan.	25,790	25,002	1,157	27,157
Feb.	25,290	24,471	1,041	27,504
Mar.	29,310	27,869	1,375	27,582
Apr.	21,671	22,380	1,225	25,131
May	19,401	20,496	980	23,554
June	26,119	24,998	1,054	23,448
July*	27,863	23,942	....	25,949

* Preliminary.
Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.

U.S.A. Exports of Synthetic Rubber

(Long Tons)

Year	SBR Types	Butyl	Neoprene	N-Type	Total
1958					
Sept.	8,802	812	2,774	518	12,906
Oct.	12,292	1,407	2,547	553	16,799
Nov.	11,872	1,306	3,010	639	16,827
Dec.	12,634	1,258	2,484	520	16,896
1959					
Jan.	11,962	1,579	3,430	520	17,491
Feb.	11,615	1,169	2,404	648	15,836
Mar.	16,295	2,238	2,712	467	21,712
Apr.	19,154	2,135	2,741	527	25,557
May	12,281	2,587	2,942	642	18,452
June	21,871	2,386	2,522	937	27,716

Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.

U.S.A. Stocks of Synthetic Rubber

(Long Tons)

Year	SBR Types	Butyl	Neoprene	N-Type	Total
1958					
Sept.	138,987	22,554	15,154	6,145	182,840
Oct.	134,613	22,091	15,474	6,356	178,534
Nov.	140,673	20,192	15,373	7,273	183,511
Dec.	143,533	18,770	15,488	7,292	185,083
1959					
Jan.	147,243	16,827	15,638	7,335	187,043
Feb.	148,606	16,339	15,990	7,468	188,403
Mar.	146,971	14,441	14,701	7,753	183,866
Apr.	147,867	12,496	14,848	7,728	182,939
May	156,209	12,710	15,024	7,820	191,763
June	145,486	11,128	14,986	7,969	179,569
July*	142,606	9,899	15,187	8,912	176,604

* Preliminary.
Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.

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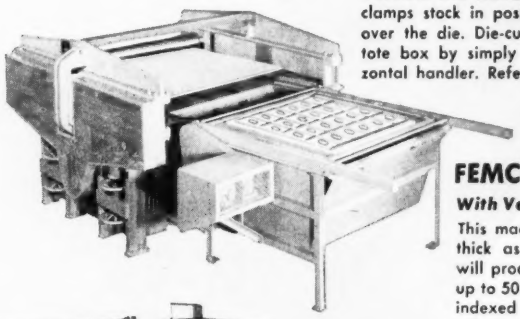
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Here are five machines in a QUALITY line of efficient, cost-saving Roller Die Cutters, built by FEMCO, a leader in the field for years.

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With Vertical and Horizontal Die Handling Mechanism

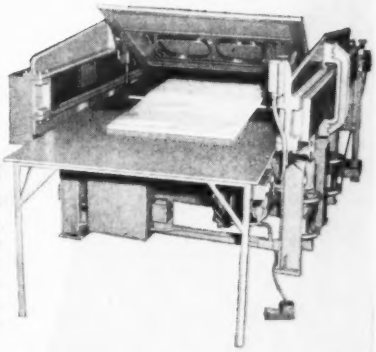
Cycles up to 6 times per minute excluding loading and unloading time and handles sheet stock materials to 50" wide x 45" deep. Vertical Die Handler precompresses and clamps stock in position before roller passes over the die. Die-cut parts are dumped into tote box by simply inverting frame of horizontal handler. Refer to Model 11304.



FEMCO ROLLER DIE CUTTER

With Vertical Die Handling Mechanism

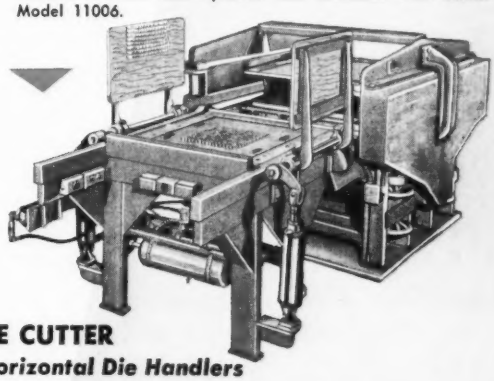
This machine has die cut foam rubber as thick as 4" with true vertical edges. It will process sheets 50" x 45" or roll stock up to 50" wide. The stock can be manually indexed into positions. Machines in operation are cycling as much as 8 times per minute. Model 11401.





STANDARD AUTOMATIC TRIMMER

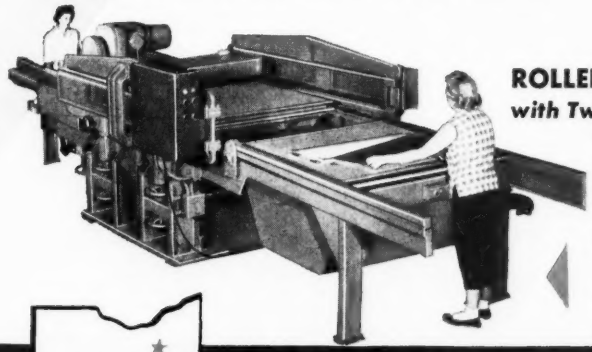
Trims entire sheets of molded rubber parts right from the mold, cutting area 29½" x 29½". Parts with two flash elevations can be trimmed. Method for trimming long items which are hard to locate in the Die has been developed. This machine has trimmed up to one thousand pieces per minute. Women can operate this machine. Ask about Model 11006.



AUTOMATIC HEAVY DUTY ROLLER DIE CUTTER

With New Roll Feed Mechanism

Automatic high production output, up to nine cycles per minute with 36" stroke. Quick change die mechanism and easy to thread pinch bar feeder make this machine very efficient on short runs. Feeds roll stock material 60" wide with maximum feed stroke of 70". Other sizes available 38" wide x 38" feed; 50" wide x 45" feed; 81" wide x 81" feed. This is Model 11622.



ROLLER DIE CUTTER

with Twin Horizontal Die Handlers

"Two machines in one." While one die handler is in cutting position, operator on opposite end of machine is unloading and reloading machine for next cutting cycle. Idle or "down" time is eliminated. Controls are arranged so that one die handler can be run independently of the other while dies are being changed. Machine cycles 6 times per minute. Women can operate it. Die cuts sheet material up to 50" wide x 45" deep. Two jobs can be run on machine at same time by using different dies in horizontal handlers. Model 11327.

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CUYAHOGA FALLS, O.

MATERIALS CUT ON THESE MACHINES include Urethane, Foam Rubber, Curled Hair, Closed or Open Cell Sponge Rubber, Vinyl Foam, Tufflex, Fiberglas, Cotton Batting, Rubber Asbestos, Gasket Materials, Steel Impregnated Asbestos, Cork, Uncured Rubber, Molded Rubber Parts, Vacuum Formed Plastics, Glass Fiber Sheets.

World Consumption of Natural Rubber

(1,000 Long Tons)

Year	United States	Eastern Europe and China	United Kingdom	Other Foreign	Total Foreign	Grand* Total
1958						
May	36.0	28.7	14.7	71.6	100.3	152.5
June	37.6	43.7	16.1	74.6	129.9	172.5
July	34.2	27.9	12.7	74.0	115.8	152.5
Aug.	39.4	33.4	8.7	60.6	102.7	145.0
Sept.	44.8	49.3	16.8	78.7	145.2	187.5
Oct.	48.9	40.5	14.2	82.1	136.8	185.0
Nov.	43.1	32.7	14.2	78.4	125.3	167.5
Dec.	47.0	46.5	17.0	76.8	140.5	187.5
1958 Total	485.2	427.0	175.5	895.8	1,497.3	1,982.5
1959						
Jan.	50.0	49.6	15.3	...	...	192.5
Feb.	47.3	29.8	13.8	77.7	117.5	167.5
Mar.	52.0	19.0	15.3	78.8	117.7	165.0
Apr.	41.5	37.8	13.9	80.2	131.0	172.5
May	38.8	41.2	13.8	76.2	131.2	170.0
June	47.8	...	18.3	...	134.7	182.5

* Estimated.

Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce; and Secretariat of the International Rubber Study Group.

World Production of Natural Rubber

(1,000 Long Tons)

Year	Malaya Estate	Malaya Native	Indonesia Estate	Indonesia Native	All Other	Total
1958						
May	27.2	18.2	17.7	20.1	145.0	61.8
June	31.2	21.9	19.7	26.0	155.0	56.2
July	36.5	23.8	20.8	45.3	175.0	48.6
Aug.	34.0	24.8	19.5	42.9	172.5	51.3
Sept.	33.8	23.6	19.0	38.6	167.5	52.5
Oct.	35.1	23.7	20.1	43.4	175.0	52.7
Nov.	31.9	19.8	20.1	43.3	170.0	54.9
Dec.	41.5	30.1	21.5	45.8	195.0	56.1
1958 Total	390.9	272.7	237.4	377.1	1,955.0	676.9
1959						
Jan.	37.6	27.2	20.3	22.4	82.5	190.0
Feb.	27.9	21.2	18.0	29.5	58.4	145.0
Mar.	28.5	21.1	17.4	40.3	45.2	155.0
Apr.	28.9	19.4	15.5	45.2	46.0	155.0
May	33.5	22.4	16.1	51.2	49.3	172.5
June	33.9	24.3	18.3	50.1	38.4	165.0

Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce; Secretariat of the International Rubber Study Group.

World Consumption of Synthetic Rubber*

(1,000 Long Tons)

Year	U.S.A.	Canada	United Kingdom	Total† Continent of Europe	World† Grand Total
1958					
May	66.3	4.0	5.5	13.3	95.0
June	69 8	4 5	6.0	13.8	100.0
July	63.9	3.9	4.7	13.5	92.5
Aug.	71.8	3.0	3.1	10.3	95.0
Sept.	78.5	4.2	5.8	14.0	110.0
Oct.	88.0	4.1	4.8	14.8	120.0
Nov.	79.0	4.3	5.2	13.8	110.0
Dec.	85.4	4.3	6.2	13.8	115.0
1958 Total	872.2	46.7	63.0	173.0	1,225.0
1959					
Jan.	89.6	4.4	5.8	15.5	122.5
Feb.	87.4	5.2	5.7	15.5	122.5
Mar.	95.1	5.0	7.0	15.8	130.0
Apr.	79.7	5.1	6.2	17.0	117.5
May	74.6	4.8	6.0	15.5	110.0
June	91.7	...	8.1	...	130.0

*Includes latices.

† Figures estimated or partly estimated.

Source: Secretariat of the International Rubber Study Group; and Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.

World Production of Synthetic Rubber

(1,000 Long Tons)

Year	U.S.A.	Canada	Germany	Total
1958				
Apr.	73.8	11.1	1.1	85.9
May	76.4	11.2	1.2	88.8
June	74.1	10.2	1.1	85.4
July	77.1	11.2	2.6	91.0
Aug.	87.3	10.9	2.3	100.5
Sept.	90.9	11.5	2.2	104.7
Oct.	100.9	12.5	2.4	115.9
Nov.	102.5	12.1	3.1	117.7
Dec.	101.6	12.9	2.7	117.3
1958 Total	1,052.8	135.0	22.7	1,210.5
1959				
Jan.	108.5	13.0	2.0	123.5
Feb.	102.3	11.7	2.3	116.3
Mar.	111.4	7.5	3.7	122.6
Apr.	108.5	0.0	3.5	111.9
May	110.0	0.3	3.0	113.3
June	106.7	...	4.7	...

Source: Secretariat of the International Rubber Study Group; and Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.

U.S.A. Imports and Production of Natural (Including Latex and Guayule) and Synthetic Rubber (in Long Tons)

Year	Natural	SBR Types	Butyl	Neoprene	N-Type	Total Natural and Synthetic
1958						
May	36,183	62,161	4,462	7,450	2,338	112,594
June	28,279	62,567	1,926	7,251	2,306	102,329
July	25,823	64,944	3,698	6,248	2,193	102,906
Aug.	39,057	73,338	4,455	6,745	2,783	126,378
Sept.	41,343	75,111	4,117	8,586	3,165	132,322
Oct.	45,136	82,741	5,338	9,283	3,619	136,022
Nov.	41,819	84,382	4,145	10,394	3,575	134,647
Dec.	54,491	85,270	3,933	9,201	3,217	156,112
1959						
Jan.	54,950	90,261	4,992	9,991	3,260	163,454
Feb.	48,917	83,067	5,650	10,256	3,324	151,214
Mar.	48,584	91,847	6,056	9,690	3,784	159,961
Apr.	44,347	88,444	6,279	10,455	3,299	152,824
May	45,451	89,625	6,467	10,249	3,610	.....
June	46,048	87,221	5,583	10,216	3,696	.....
July*	.....	94,749	6,391	9,365	3,811	.....

*Preliminary.

Source: Bureau of the Census, Industry Division, Chemicals Branch, United State Department of Commerce.

U.S.A. Consumption of Natural and Synthetic Latices

(Long Tons, Dry Weight)

Year	Natural	SBR	Neoprene	N-Type	Total Synthetic	Total Natural & Synthetic
1958						
Apr.	4,847	4,093	707	797	5,597	10,444
May	5,004	4,102	785	795	5,682	10,686
June	5,304	4,165	639	919	5,723	11,027
July	4,531	3,433	629	703	4,765	9,296
Aug.	6,094	4,654	764	1,025	6,443	12,537
Sept.	6,748	5,779	820	1,017	7,616	14,364
Oct.	7,725	6,534	979	1,120	8,633	16,358
Nov.	6,540	6,009	798	1,108	7,915	14,455
Dec.	6,820	6,893	805	1,106	8,804	15,624
1959						
Jan.	7,184	6,886	925	1,244	9,055	16,239
Feb.	6,489	7,083	859	1,009	8,951	15,440
Mar.	7,052	7,275	1,054	1,208	9,537	16,589
Apr.	5,793	5,629	1,104	1,169	7,902	13,695
May	5,429	5,962	995	1,112	8,069	14,966
June	5,622	6,497	910	1,150	8,557	14,179
July	5,004	5,804	919	940	7,663	12,667

* Preliminary.

Source: Bureau of the Census, Industry Division, Chemicals Branch, United States Department of Commerce.

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FILM LAMINATION EXPERT

to set up, run, and head up a lamination department for specialty manufacturer located near Hartford, Conn., area. Applicant must be experienced in handling film laminations and be capable of administering the operation. Salary open. Write in detail to:

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Experienced chemist needed for development activity on a varied line of rubber products for industrial applications. Work includes investigation and evaluation of recent elastomers as well as the more common types. Projects of an individual nature from laboratory through pilot plant stage to full production. Some technical service may be included.

Assignment — Research and Development Center, Lancaster, Pennsylvania

Send confidential résumé to:

W. J. VanPelt

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PRODUCT DEVELOPMENT ENGINEER—FLOOR COVERING West Coast opportunity with an established rapidly expanding flooring manufacturer. This is excellent opportunity for a man with a good background of experience in vinyl and rubber flooring. Must be able to work directly with a top executive as well as factory personnel. Send résumé and photo in confidence to Technical Director, BURKE RUBBER COMPANY, INC., P. O. Box 190, San Jose, California.

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TECH. DIRECTOR, NOW EMPLOYED, SEEKS NEW POSITION. Lab. supervision, formula development, plant processing problems. Experience with new polymers and meeting specifications. Address Box No. 2380, care of RUBBER WORLD.

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FOR SALE: 71—BAKER-PERKINS 200-GAL. DOUBLE-ARM mixers, sigma or duplex blades, jacketed, tilting mechanism, motors & drives. Priced to sell fast! PERRY EQUIPMENT CORP., 1424 N. 6th St., Phila. 22, Pa.

Carbon Black Statistics—January-July, 1959

Furnace blacks are classified as follows: SRF, semi-reinforcing furnace black; HMF, high modulus furnace black; GPF, general-purpose furnace black; FEF, fast-extruding furnace black; HAF, high abrasion furnace black; SAF, super abrasion furnace black; ISAF, intermediate super abrasion furnace black.

(Thousands of Pounds)

Furnace types	Jan.	Feb.	Mar.	Apr.	May	June	July
Production							
Thermal	12,187	11,675	12,469	22,957	23,728	22,925	25,606
SRF	23,004	21,767	23,108	14,293	14,443	13,875	13,490
HMF	6,487	5,169	5,694	6,810	5,412	6,043	7,321
GPF	5,000	5,545	6,942	7,937	8,723	7,849	7,623
FEF	21,579	19,286	23,372	21,683	20,925	20,955	21,284
HAF	39,114	37,892	46,534	43,315	45,057	38,694	44,418
SAF	293	—	—	—	1,656	3,303	618
ISAF	16,605	14,490	19,262	19,770	18,365	16,366	21,133
Total furnace	124,269	118,824	137,381	136,265	138,309	130,010	141,493
Contact types	26,890	24,695	28,029	27,624	27,752	26,346	27,076
Totals	151,159	143,519	165,410	164,389	166,061	156,356	168,569
Shipments							
Furnace types							
Thermal	12,283	12,658	14,904	13,223	12,313	14,105	12,299
SRF	26,251	26,009	29,465	24,244	21,012	23,650	25,805
HMF	6,420	5,122	6,299	5,895	5,748	6,061	7,454
GPF	6,977	7,245	7,397	8,336	8,375	8,091	8,898
FEF	24,511	20,924	25,949	19,575	17,558	20,991	22,865
HAF	45,800	42,890	47,161	40,675	32,238	43,360	49,883
SAF	615	583	897	553	946	1,543	950
ISAF	17,391	16,739	19,859	18,934	19,133	19,956	23,399
Total furnace	141,248	132,170	151,931	131,435	117,323	137,757	151,553
Contact types	31,852	28,221	29,214	24,453	26,386	25,574	29,207
Totals	172,100	160,391	181,145	155,888	143,709	163,331	180,760
Producers' Stocks, End of Period							
Furnace types							
Thermal	23,181	22,198	19,759	20,829	22,959	22,729	23,920
SRF	35,764	31,522	25,165	23,979	26,842	26,254	26,192
HMF	6,856	6,903	6,298	7,169	6,686	6,668	6,535
GPF	7,658	5,958	5,503	5,104	5,452	5,073	3,661
FEF	17,213	15,575	12,998	15,106	18,473	18,437	16,856
HAF	38,010	33,012	32,382	35,018	47,837	43,171	37,706
SAF	5,071	4,487	3,586	3,028	3,738	5,498	5,166
ISAF	38,708	39,459	38,862	39,698	38,930	35,340	33,074
Total furnace	172,461	159,114	144,553	149,931	170,917	163,170	153,110
Contact types	88,646	85,120	83,935	87,098	88,368	89,140	87,009
Totals	261,107	244,234	228,488	237,029	259,285	252,310	240,119
Exports							
Furnace types							
Total furnace	29,543	19,442	30,154	29,600	27,123	163,170	—
Contact types	15,604	12,930	13,037	11,702	14,079	89,140	—
Totals	45,147	32,372	43,191	41,302	41,202	252,310	—

Source: Bureau of Mines, United States Department of the Interior, Washington, D. C.

U.S.A. Synthetic Rubber Industry, Wages, Hours

Year	Average Weekly Earnings	Average Weekly Hours	Average Hourly Earnings
1958			
Apr.	108.14	40.2	2.69
May	110.03	40.6	2.71
June	112.61	41.1	2.74
July	111.52	40.7	2.74
Aug.	112.75	41.0	2.75
Sept.	113.98	41.0	2.78
Oct.	114.67	41.1	2.79
Nov.	117.88	41.8	2.82
Dec.	120.56	42.3	2.85
1959			
Jan.	121.56	42.4	2.86
Feb.	118.53	41.3	2.87
Mar.	118.08	41.0	2.88
Apr.	118.53	41.3	2.87
May	122.67	42.3	2.90

Source: BLS, United States Department of Labor.

U.S.A. Production of Cotton, Rayon, and Nylon Tire Fabrics

(Thousands of Pounds)

	Cotton and Nylon*			
1958	Cotton Chafer Fabrics and Other Tire Fabrics	Cotton and Nylon Tire Cord and Fabrics	Rayon Tire Cord and Tire Cord Fabric	Total All Tire Cord and Fabrics
Jan.-Mar.	9,750	18,820	66,830	167,924
Apr.-June	7,890	24,725	49,454	80,533
July-Sept.	7,999	24,904	†	91,984
Oct.-Dec.	10,533	26,392	71,827	107,532
1959				
Jan.-Mar.	9,163	32,402	77,307	122,661
Apr.-June	7,699	29,403	76,265	116,965

* Cotton and nylon figures combined to avoid disclosing data for individual companies.
† Not available.
Source: Bureau of the Census, United States Department of Commerce.

MACHINERY & SUPPLIES FOR SALE (Cont'd)

6—NEW FARREL-BIRMINGHAM 14" X 30" TWO-ROLL MILLS. Other sizes up to 60". Hydraulic Presses, 325-ton upstroke 28" x 28", 300-ton upstroke 40" x 30", 300-ton upstroke 22" x 35", 240-ton upstroke with ten 24" x 56" platens, 150-ton Farrel 24" x 24", 120-ton 3 openings 24" x 18". Hartig 3¼" Plastic Extruder, electrically heated. Adamson 6" Rubber Extruder. New and used Laboratory 6" x 13", 6" x 16", and 8" x 16" Mills and Calenders. Baker-Perkins and Day Heavy-Duty Jacketed Mixers, up to 200 gallons. Hydraulic pumps and accumulators. Cumberland #½ Rotary Cutter 5 HP & other sizes. Colton 4T Preform Machine motor driven. Other sizes in Single-Punch and Rotary types. Banbury Mixers, Crushers, Churns, Tubers, Vulcanizers, Bale Cutters, Gas Boilers, etc. SEND FOR SPECIAL BULLETIN. WE BUY YOUR SURPLUS MACHINERY. STEIN EQUIPMENT COMPANY, 107-8TH STREET, BROOKLYN 15, NEW YORK. STERLING 8-1944.

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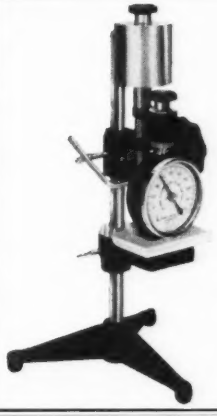
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U.S.A. Rubber Industry Employment, Wages, Hours

Year	Production Workers (1000's)	Average Weekly Earnings	Average Weekly Hours	Average Hourly Earnings	Consumer's Price Index
		All Rubber Products			
1939	121.0	$27.84	39.9	$0.75	
1958					
Feb.	191.3	85.04	37.3	2.28	122.5
Mar.	184.0	87.02	38.0	2.29	123.5
Apr.	176.0	85.88	37.5	2.29	123.6
May	172.3	87.86	38.2	2.29	123.7
June	175.8	91.10	39.1	2.33	123.9
July	175.1	91.89	39.2	2.35	123.7
Aug.	181.2	96.80	40.5	2.39	123.7
Sept.	187.5	97.51	40.8	2.39	123.7
Oct.	194.5	97.27	40.7	2.39	123.7
Nov.	195.3	98.09	40.7	2.41	123.9
Dec.	198.2	102.66	41.9	2.45	123.7
1959					
Jan.	199.1	100.28	41.1	2.44	123.8
Feb.	198.8	101.09	41.6	2.43	123.7
Mar.	201.5	103.74	42.0	2.47	123.7
Apr.	176.0	101.57	41.8	2.43	123.9
May	174.3	101.52	42.3	2.40	124.5
		Tires and Tubes			
1939	54.2	$33.36	35.0	$0.96	
1958					
Feb.	78.5	93.02	35.1	2.65	
Mar.	76.0	98.05	37.0	2.65	
Apr.	72.1	95.67	36.1	2.65	
May	70.4	99.48	37.4	2.66	
June	71.2	103.63	38.1	2.72	
July	71.0	106.59	38.9	2.74	
Aug.	72.5	113.96	40.7	2.80	
Sept.	74.1	113.40	40.5	2.80	
Oct.	75.3	113.24	40.3	2.81	
Nov.	76.2	115.75	40.9	2.83	
Dec.	77.1	121.40	42.3	2.87	
1959					
Jan.	76.9	117.55	41.1	2.86	
Feb.	76.2	118.98	41.6	2.86	
Mar.	77.9	122.96	42.4	2.90	
Apr.	66.0	123.98	42.9	2.89	
May	50.5	128.77	43.8	2.94	
		Rubber Footwear			
1939	14.8	$22.80	37.5	$0.61	
1958					
Feb.	17.0	74.68	39.1	1.91	
Mar.	16.7	76.61	39.9	1.92	
Apr.	16.5	75.46	39.3	1.92	
May	16.3	75.85	39.3	1.93	
June	16.3	77.20	40.0	1.93	
July	15.9	75.25	39.4	1.91	
Aug.	16.4	77.18	40.2	1.92	
Sept.	16.8	76.62	39.7	1.93	
Oct.	17.1	77.01	39.9	1.93	
Nov.	17.2	77.22	39.6	1.95	
Dec.	17.1	78.01	39.8	1.96	
1959					
Jan.	17.1	78.20	39.9	1.96	
Feb.	17.1	80.59	40.7	1.98	
Mar.	17.4	79.79	40.3	1.98	
Apr.	12.9	73.05	39.7	1.84	
May	18.4	79.98	40.6	1.97	
		Other Rubber Products			
1939	51.9	$23.34	38.9	$0.61	
1958					
Feb.	95.8	80.32	38.8	2.07	
Mar.	91.3	79.87	38.4	2.08	
Apr.	87.4	79.87	38.4	2.08	
May	85.6	80.29	38.6	2.08	
June	88.3	83.77	39.7	2.11	
July	88.2	83.53	39.4	2.12	
Aug.	92.3	86.24	40.3	2.14	
Sept.	96.6	89.21	41.3	2.16	
Oct.	102.1	88.78	41.1	2.16	
Nov.	101.9	88.54	40.8	2.17	
Dec.	104.0	92.60	41.9	2.21	
1959					
Jan.	105.1	91.27	41.3	2.21	
Feb.	105.5	91.96	41.8	2.20	
Mar.	106.2	93.02	41.9	2.22	
Apr.	97.1	90.03	41.3	2.18	
May	105.4	92.60	41.9	2.21	

Source: BLS, United States Department of Labor.

U.S.A. Automotive Pneumatic Casings

(Thousands of Units)

Year	Shipments: Original Equipment	Shipments: Replacement	Shipments: Export	Shipments: Total	Production	Inventory End of Period
Passenger Car						
1958						
June	1,667	6,387	62.8	8,117	7,306	17,465
July	1,756	6,502	60.0	8,318	6,368	15,490
Aug.	847	5,807	57.2	6,711	6,753	15,535
Sept.	1,170	5,425	63.9	6,659	7,134	16,045
Oct.	1,522	5,369	80.6	6,972	7,983	17,134
Nov.	3,056	3,651	57.7	6,765	7,182	17,420
Dec.	3,701	3,977	61.2	7,739	8,046	17,818
1959						
Jan.	2,631	6,028	56.9	8,716	8,859	17,998
Feb.	2,442	4,932	60.2	7,434	8,962	19,435
Mar.	2,930	6,261	61.7	9,253	9,959	20,181
Apr.	3,115	6,390	64.8	9,569	6,986	17,597
May	2,848	5,617	38.4	8,504	6,953	15,721
June	2,904	5,936	46.3	8,886	9,022	16,134
July	3,188	5,988	65.4	9,242	9,857	16,853
Truck and Bus						
1958						
June	265	794	54	1,113	988	3,456
July	265	940	51	1,255	920	3,114
Aug.	208	871	57	1,136	1,009	2,986
Sept.	273	940	41	1,253	1,143	2,880
Oct.	316	1,106	59	1,482	1,361	2,779
Nov.	313	669	42	1,023	1,211	2,983
Dec.	356	734	63	1,153	1,330	3,171
1959						
Jan.	329	714	47	1,090	1,325	3,401
Feb.	364	679	74	1,117	1,308	3,584
Mar.	406	842	56	1,304	1,391	3,680
Apr.	479	907	44	1,430	1,039	3,276
May	442	738	41	1,222	943	3,006
June	488	820	44	1,352	1,272	2,954
July	400	844	47	1,290	1,366	3,023
Total Automotive						
1958						
June	1,932	7,182	117	9,231	8,293	20,920
July	2,020	7,442	111	9,573	7,288	18,604
Aug.	1,055	6,679	115	7,848	7,762	18,521
Sept.	1,442	6,365	105	7,912	8,277	18,925
Oct.	1,838	6,476	140	8,454	9,344	19,913
Nov.	3,369	4,320	100	7,788	8,393	20,403
Dec.	4,057	4,711	124	8,892	9,376	20,988
1959						
Jan.	2,961	6,742	104	9,806	10,184	21,399
Feb.	2,805	5,611	135	8,551	10,270	23,019
Mar.	3,336	7,103	117	10,557	11,350	23,862
Apr.	3,594	7,297	108	10,999	8,025	20,872
May	3,291	6,356	79	9,726	7,796	18,727
June	3,392	6,756	90	10,237	10,294	19,098
July	3,588	6,832	112	10,532	11,223	19,877

Source: The Rubber Manufacturers Association, Inc.

U.S.A. Automotive Inner Tubes

(Thousands of Units)

Year	Shipments: Original Equipment	Shipments: Replacement	Shipments: Export	Shipments: Total	Production	Inventory End of Period
1958						
Aug.	160	3,097	74	3,331	3,305	7,664
Sept.	207	3,228	63	3,498	3,390	7,657
Oct.	244	3,237	84	3,567	3,768	7,869
Nov.	264	2,575	60	2,899	3,319	8,372
Dec.	288	3,029	94	3,411	3,491	8,617
1959						
Jan.	287	4,450	63	4,800	3,806	7,536
Feb.	311	3,924	81	4,316	4,094	7,364
Mar.	339	4,013	83	4,435	4,459	7,629
Apr.	389	3,473	65	3,928	3,380	7,218
May	363	2,853	59	3,275	2,752	6,849
June	392	3,421	59	3,872	3,683	6,999
July	317	3,564	66	3,948	4,345	7,560

Source: The Rubber Manufacturers Association, Inc.

MACHINERY & SUPPLIES FOR SALE (Cont'd)

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U.S.A. Rubber Industry Economic Indicators

	Production Index*					% Return †			
						On Sales		Investment On	
Year	All Rubber Products	Total Tires & Tubes	Auto Tires	Truck & Bus Tires	Miscellaneous Rubber Products	R	R&MP‡	R	R&MP
1956	133	121	123	119	144	4.5		9.0	
1957	135	123	134	107	147	4.2		8.5	
1958	125	113	120	103	136	3.9	3.5	7.3	7.0
Mar.	118	108	115	98	128	3.0	2.2	5.2	4.0
Apr.	115	103	112	91	125				
May	112	102	113	88	121				
June	122	117	131	99	127	3.4	3.4	6.4	6.8
July	103	96	105	85	108				
Aug.	127	110	118	99	142				
Sept.	137	117	122	109	156	4.5	4.4	9.2	9.2
Oct.	143	129	131	125	156				
Nov.	145	128	131	124	160				
Dec.	137	128	132	122	146	4.5	3.9	9.6	8.4
1959									
Jan.	150	138	149	124	161				
Feb.	158	154	167	137	161				
Mar.	159	155	171	133	163		3.9		8.0
Apr.	138	111	120	99	163				
May	132	108	120	92	154				

* F.R.B. Index of Industrial Production Unadjusted (1947-49 Avg., 100%).
† Base Data F.T.C.-S.E.C.-Quarterly Financial Reports—% Calculated by RMA.
‡ R = Rubber; R&MP = Rubber and Miscellaneous Plastics, a classification revised according to the 1959 Standard Industrial Classifications.

• • •

Wing-Stay 100

(*Continued from page 96*)

oxidation rate as reported by Spacht *et al.*[4]

A range of concentrations of the antiozonant was evaluated in SBR 1500, 1500C, 1712, and 1712C tread-type stocks. Tests were conducted on oven aged and unaged stocks in an ozone box and out of doors in both Akron and Los Angeles. Data obtained indicated that 3 to 4 phr. of Wing-Stay 100 in SBR 1500, or 4 phr. in SBR 1712, result in a high degree of protection against static and kinetic exposure. The rubbers with the C designation, which contain the antiozonant as stabilizer, showed equal ability to resist ozone with 0.75 phr. less antiozonant added in compounding.

A visual method for assessing the ozone damage to all kinds of samples was used for this work. A numerical system was developed for rating both amount and size of cracks. The product of these ratings, weathering index, is easily recognized as a measure of ozone attack.

Scorch data obtained with both the Ordnance and the other test formulations demonstrate that the Wing-Stay 100-protected stocks will be safer processing than those containing most of the other antiozonants evaluated.

Acknowledgment

The authors wish to thank the development department testing laboratories in Akron and California, and the research department of the Goodyear Tire & Rubber Co. for aid in gathering the data for this paper. We also wish to thank The Goodyear Tire & Rubber Co. for permitting its publication.

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A

Adamson United Co. 55
Albert, P. E., & Son 143
Allied Chemical Corp., National Aniline Division 75
American Cyanamid Co., Rubber Chemicals Dept. 133
American Hard Rubber Co. 145
American Synthetic Rubber Corp. .. 127
American Zinc Sales Co. 115
Armstrong Cork Co. 141

B

Brooklyn Color Works, Inc. 146
Brown Rubber Co., Inc. 145
Burton Rubber Processing, Inc. 145

C

Cabot, Godfrey L., Inc. ....Back Cover
Carter Bell Mfg. Co., The 26
Claremont Flock Corp. 54
CLASSIFIED ADVERTISEMENTS 141, 143, 145, 146
Cleveland Liner & Mfg. Co., The Third Cover
Columbian Carbon Co. ..Insert 103, 104
CONSULTANTS & ENGINEERS .. 146
Continental Carbon Co. 64, 65
Continental Machinery Co., Inc. .. 146
Copolymer Rubber & Chemical Corp. ..... Insert 21

D

Darlington Chemicals, Inc. 74
Dow Corning Corp. 135
DPR Incorporated, A Subidiary of H. V. Hardman Co. 74
du Pont de Nemours, E. I., & Co. Second Cover

E

Eagle-Picher Co., The 58
Enjay Co., The 119
Erie Engine & Mfg. Co. 70

F

Falls Engineering & Machine Co., The 139
Farrel-Birmingham Co., Inc. 67
Ferry Machine Co. 56
Firestone Synthetic Rubber & Latex Co. 46, 47

G

Gammeter, W. F., Co., The 143
General Research & Supply Co. .. 66
General Tire & Rubber Co., The (Chemical Division) 68, 69
Goodrich, B. F., Chemical Co. 3
Goodrich-Gulf Chemicals, Inc. Insert 31, 32
Goodyear Tire & Rubber Co., Inc., The (Chemical Division) Insert 11-12; 13

H

Hale & Kullgren, Inc. 146
Hall, C. P., Co., The 80
Harwick Standard Chemical Co. .. 37
Hobbs Manufacturing Co. 16
Huber, J. M., Corp. 78

I

Iddon Brothers, Ltd. 76
Industrial Ovens, Inc. 27
Institution of the Rubber Industry .. 52

J

Johnson Corp., The 74

K

K. B. C. Industries, Inc. 146

L

Litzler, C. A., Co., Inc. 56

M

Marbon Chemical, Division of Borg-Warner Corp. 17
Marchant, Heyworth & Swift, Ltd. .. 145
Merck & Co., Inc., Marine Magnesium Division 30
Miller-Stephenson Chemical Co., Inc. 54
Motch & Merryweather Machinery Co., The, Wink Cutter Division .. 59
Muehlstein, H., & Co., Inc. 15

N

National Aniline Division, Allied Chemical Corp. 75
National Polychemicals, Inc. 117
National-Standard Co. 24, 25
Naugatuck Chemical Division of U. S. Rubber Co. 19
Neville Chemical Co. 73

P

Pennsalt Chemicals Corp. 23
Pennsylvania Industrial Chemical Corp. 14
Phillips Chemical Co. 6, 131
Pike, S. J., Co. 137
Polymer Corp., Ltd. .....Insert 121

R

Rand Rubber Co. 146
Rayonier, Inc. 28, 29
Roeblina's, John A., Sons Corp. Insert 49
Royce Chemical Co. 154
Royle, John, & Sons 48
Rubber Regenerating Co., Ltd. 125

S

St. Joseph Lead Co. 62
Sargent's, C. G., Sons Corp. 136
Scott Testers, Inc. 76
Scovill Manufacturing Co. 51
Shaw, Francis, & Co., Ltd. 22
Shell Chemical Corp., Synthetic Rubber Division Insert 60, 61
Shore Instrument & Manufacturing Co., Inc., The 143
Sinclair-Collins Valve Co., The 57
Skinner Engine Co. 72
Snell, Foster D., Inc. 146
Socony Mobil Oil Co., Inc. 34, 35
Southern Clays, Inc. 44
Stamford Rubber Supply Co., The .. 48

T

Taylor Instrument Cos. 41
Taylor, Stiles & Co. 20
Texas-U. S. Chemical Corp. Insert 42, 43
Textile Proofers, Inc. 66
Thiokol Chemical Corp. 9
Torrington Co., The 77
Turner Halsey Co. 45
Tyrex, Inc. 53

U

United Carbon Co., Inc. 38, 39
United Engineering & Foundry Co. .. 71
United Rubber Machinery Exchange 143
Universal Oil Products Co. 63

V

Vanderbilt, R. T., Co., Inc. 122
Velsicol Chemical Corp. 33

W

Wade, L. C., Co., Inc. 143
Wellington Sears Co. 129
Wellman Co. 143
White, J. J., Products Co. 70
Whittaker, Clark & Daniels, Inc. 36
Williams, C. K., & Co., Inc. 40
Williams, George A., & Son 58
Witco Chemical Co., Inc. 64, 65
Wood, R. D., Co. 50

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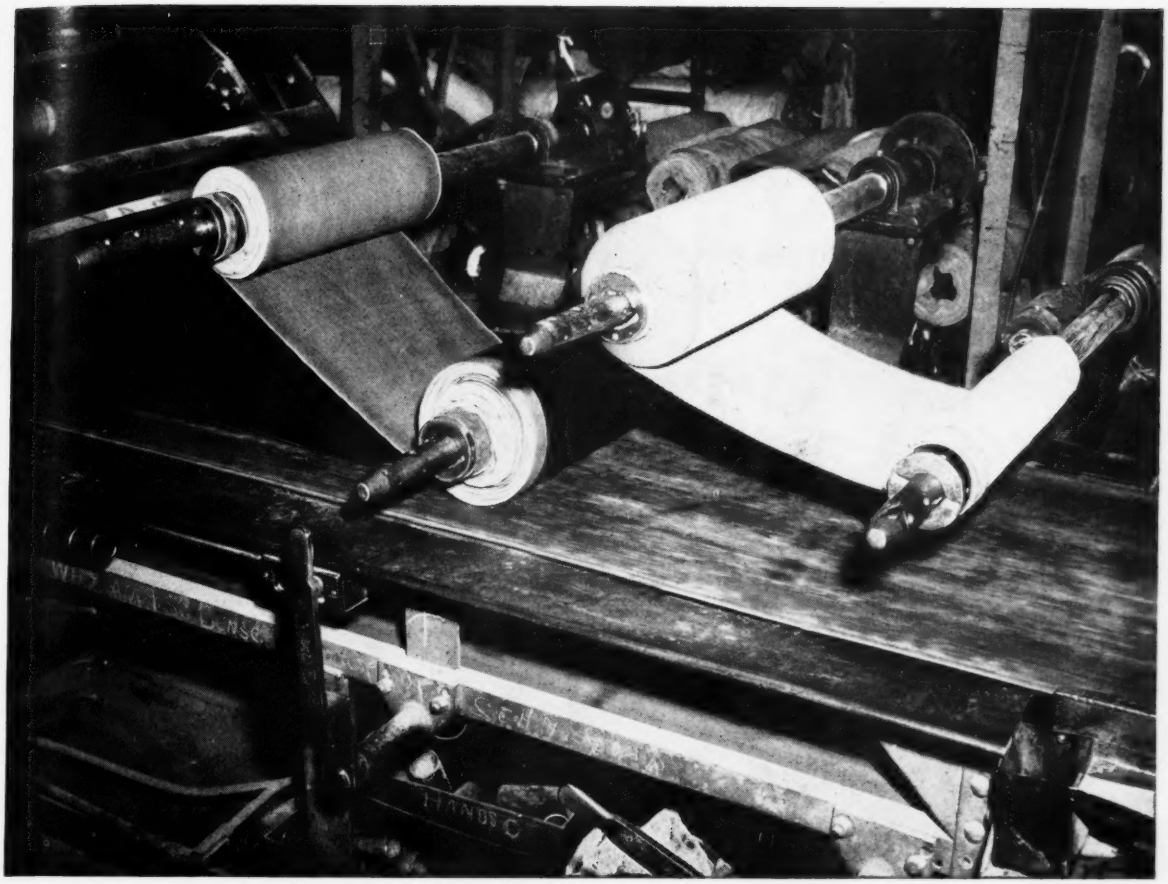
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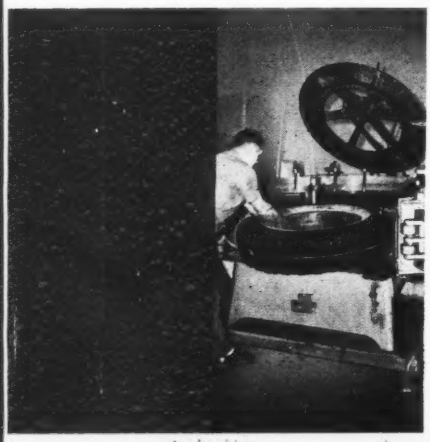
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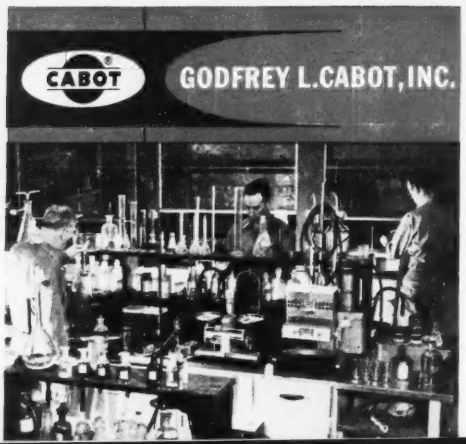


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